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A National Environmental/Energy Workforce Assessment. Pennsylvania

National Field Research Center, Inc, Iowa City, Iowa

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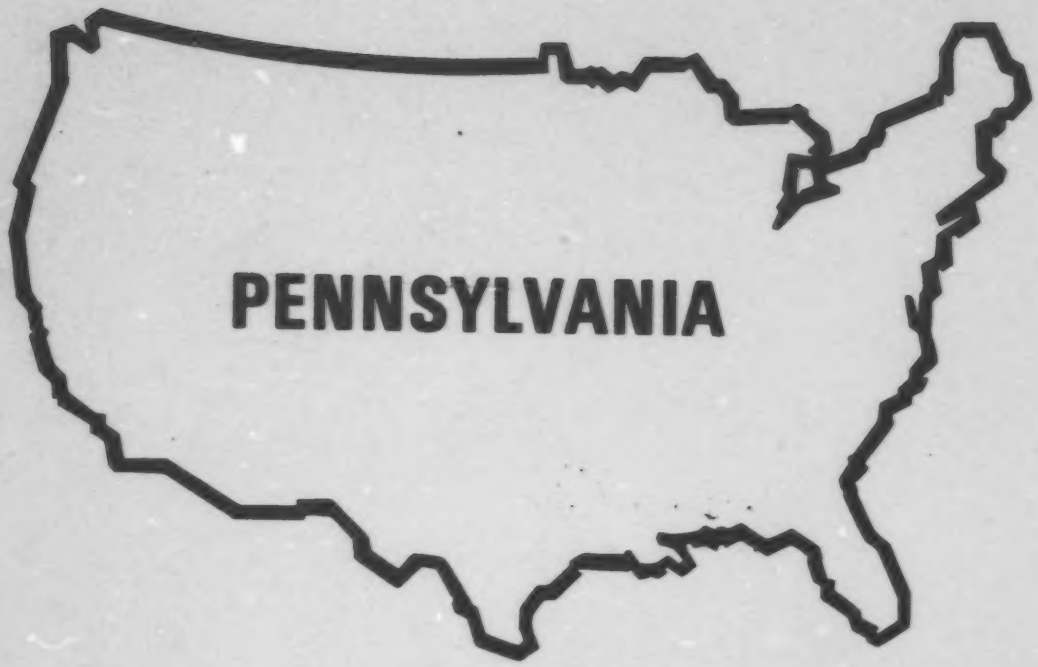
A National Environmental/Energy Workforce Assessment



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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

17. KEY WORDS AND DOCUMENT ANALYSIS

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WORKFORCE ASSESSMENT

for

PENNSYLVANIA

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

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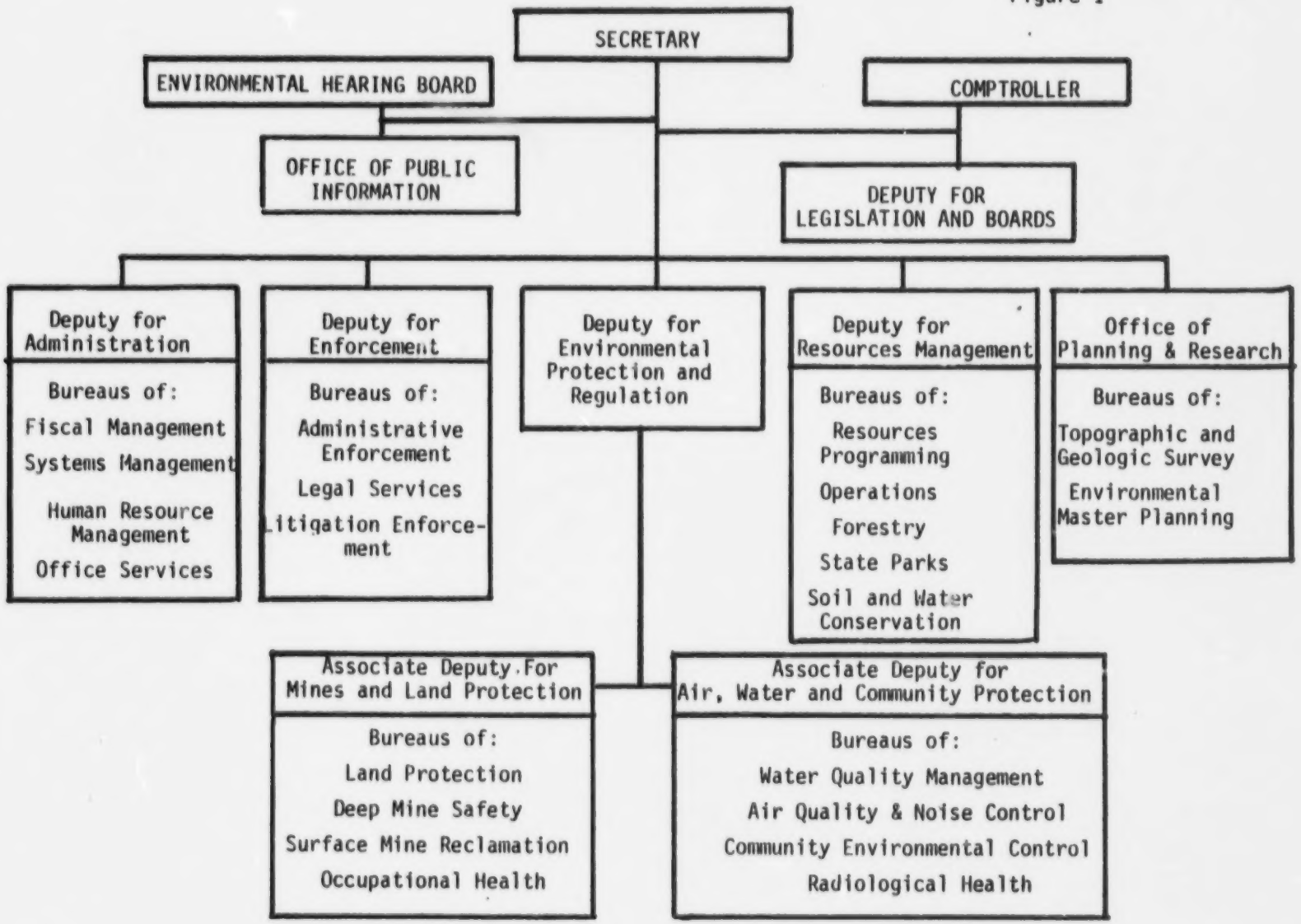
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Figure 1



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PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976-1981) based on available information for the Commonwealth of Pennsylvania in the environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, wastewater, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for Pennsylvania. The format includes workforce profiles, projections, growth and career potential for each of the areas investigatec. Growth projections are necessarily based on best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air

Noise

Pesticides

Potable Water

Radiation

Solid Waste

Wastewater

Energy

National Environmental Energy
Workforce Assessment

Phase I

PENNSYLVANIA

State Summary

I. AIR

There are six Air Quality Control Regions (AQCR) in Pennsylvania as provided for in the State Implementation Plan (SIP). The AQCRs include: Metropolitan Philadelphia Interstate, Northeast Pennsylvania - Upper Delaware Valley Interstate, Northwest Pennsylvania - Youngstown Interstate, Central Pennsylvania, South Central Pennsylvania, and Southwest Pennsylvania.

Air pollution control and abatement activities in Pennsylvania are the responsibility of the Bureau of Air Quality and Noise Control, located within the Department of Environmental Resources (DER). Pennsylvania's efforts in air pollution control originated in 1960 with the passage of the Air Pollution Control Act.

The Bureau of Air Quality and Noise Control has a staffing level of 224 persons. Estimations of statewide staffing levels were inconclusive at this writing.

DER officials have indicated that the program staffing levels can be expected to increase to 325 persons, or a gain of 101 by 1982. This represents a seven percent per annum increase. It has been estimated that a workforce of 405 persons would be required for implementation of the program. Turnover has been very low, about two percent, and is expected to remain at that level. Increases are expected to occur in all categories, but opportunities will still be greatest for engineers.

II. NOISE

The noise program in the Commonwealth of Pennsylvania is the responsibility of the Bureau of Air Quality and Noise Control, located in the Department of Natural Resources. The bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority includes all environmental noise problems.

At present, there is only one person, a scientist, involved in the noise program in the Bureau of Air Quality and Noise Control. The noise program does not formally exist in the state budget. Although there are currently no funds allocated for noise control in the state, professionals estimate that the state budget could allow for 12 to 15 people in noise control over the next five years.

No firm figures are available for the private sector. Ordinarily, these personnel would be involved in other activities such as law enforcement.

Career potential in the noise program is dependent in large part upon the availability of funds to expand the program over the next few years. If professional workforce projections hold true, there would be limited career opportunities for engineers and scientists. Generally, a four year degree will be required with some specialized training in noise abatement and control or advanced training in acoustics. Several technical positions may be created if the resources become available to implement new programs.

III. PESTICIDES

The Pennsylvania Department of Agriculture, Bureau of Plant Industries, has responsibility for implementation of the state's pesticide control program. The legal authority for pesticide regulation is the Pennsylvania Pesticide Control Act of 1973. The law provides for the certification of pesticide applicators and the registration of pesticides and pesticide products.

In addition to 13 state program personnel, professionals estimate that there are 50,520 private applicators and 5,750 commercial applicators in the state that must be certified under the law. Thousands of others, primarily farmers, are also pesticide applicators but do not require certification.

The Bureau of Plant Industries has indicated that substantial growth in the pesticides program could occur over the next five years. The projections would increase the program to between 17 and 30 people by 1982. The primary need is for field inspection personnel. Projections for the applicator categories were unavailable at this writing.

There appears to be a limited amount of career potential in pesticide control at the state level. Program officials suggested a wide range in the staffing projections for the next five years. If optimum projections are correct, there will be a demand for technically trained persons as field inspectors and laboratory technicians.

IV. POTABLE WATER

The Pennsylvania Department of Environmental Resources conducts the water supply program through the Bureau of Water Quality Management, Division of Water Supply and Sewerage. The program mission is to ensure that public water supplies provide safe and sanitary drinking water.

There are currently 126 persons in water supply at the state level, primarily engineers with degrees in sanitary engineering, sanitarians, and clerical support personnel. In addition, there are 67 persons who provide support services to both the water supply and wastewater programs in the Department.

Workforce projections for water supply in Pennsylvania are unapproachable at this time. Financial constraints will undoubtedly inhibit growth at the state level, also making it unlikely that Pennsylvania will assume primacy for the Safe Drinking Water Act. However, the state must still comply with SDWA regulations, and it is possible that this will require an increased workforce.

The potential for careers in water supply in the Commonwealth of Pennsylvania is dependent, in large part, upon the state's ability to finance new training programs and support new positions, as well as the federal government's commitment to provide funding to the state for expansion of its water supply program. However, Pennyslvania's decision not to assume primacy for SDWA will be an inhibiting factor with regard to job availability.

V. RADIATION

Primary responsibility for radiation protection has been allocated to the Bureau of Radiological Health, the Department of Environmental Resources (DER). Under the Pennsylvania Atomic Energy Development and Radiation Control Act, the State Department of Commerce is responsible for the promotion and development of atomic energy resources and the coordination of atomic energy activities of various agencies and units of government. There are 11 nuclear power facilities located or planned for future location in Pennsylvania.

The present workforce includes 24 persons at the state level. The private sector staffing levels were unavailable at this writing. At the state level, growth should occur at an average rate of 11% per annum.

Program officials anticipate that requirements for future careers in radiation protection will not change significantly from current requirements. Within the state program, the majority of available positions will continue to require radiation health physicists. Career potential will be very limited for non-professionals.

In the private sector, career potential will exist at nuclear power plants. It is estimated that five additional nuclear facilities will be in operation by 1981. Although it is difficult to precisely forecast occupational availability, an increased number of jobs will be available through these additional facilities.

VI. SOLID WASTE

The solid waste management program originated in Pennsylvania in 1966, with a federal program grant which financed a statewide inventory of collection, processing and disposal practices. The findings of the 1966 survey resulted in the enactment of the Pennsylvania Solid Waste Management Act in 1968, the first comprehensive statewide solid waste legislation in the nation. In 1972, the Department of Environmental Resources (DER) was created and solid waste management became a function of this agency. The program is now administered through the Division of Solid Waste Management of the Bureau of Land Protection within DER.

County-wide solid waste management plans have been developed in 66 of the 67 counties and regional plans have been adopted in 3 multi-county regions. Implementation of the plans has proceeded slowly due to limited funding by local governments. There are nearly 500 disposal facilities within the state, of which 123 are permitted sanitary landfills. The 375 other sites operate without permits and the DER is unable to close them down since viable disposal alternatives do not exist in those areas.

The state level workforce includes 72 persons. Additional workforce in solid waste management exists at the community level in landfill operations and waste collection and in the private sector in landfill operations, collection, and resource recovery. State level personnel should experience a 9% per annum increase. Statewide staffing projections were unavailable at this writing.

VII. WASTEWATER

Pennsylvania's wastewater program is the responsibility of the Bureau of Water Quality Management within the Department of Environmental Resources. The Bureau of Water Quality Management has performed numerous activities in carrying out the mandates of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972.

Both the Delaware Valley Regional Planning Commission and the Southwestern Pennsylvania Regional Planning Commission were designated as areawide and basin water quality management planning agencies under Section 208 of FWPCA. The Comprehensive Water Quality Management Planning program has been continued in other portions of the state to serve as the base for "208" planning.

The current staffing level of Pennsylvania's wastewater program consists of 175 people located in the Bureau of Water Quality Management. The number of persons working in wastewater control across the state was unavailable at this writing.

Career potential in the wastewater program is impossible to predict accurately since projections of workforce demand are not available. Because of the budgetary problems within the state little, if any, opportunity exists at the present time in this program. It can be assumed, however, that the demand for trained operations personnel in sewage treatment plants will continue to exist at the local level.

VIII. ENERGY

Energy Office functions in Pennsylvania are the responsibility of the Governor's Energy Council, which was established by Executive Order of the Governor on Febraury 11, 1974. The Council is basically a coordinating agency which draws much of its technical expertise from other state agencies. Under the Executive Order, the Council has the authority to mandate a technical workforce from other state departments. The Council is composed of members of many state agencies so there is a very good relationship with other department organizations within Pennsylvania. The Council has developed expertise in developing a Coal Revitalization Policy, an Energy Parks Policy, a Conservation program, an Allocation program and a Winterization program.

The Energy Council has a total present staff of about 27 to 28 persons and most of its personnel have a public relations orientation. The Council's coordinators provide liaison with other officials in the Pennsylvania government for supportive services. The Council's officials anticipate hiring an additional 22-23 people to bring its total staffing level to about 50 by 1978. The Council is currently recruiting personnel to fulfill state emergency and conservation planning mandated under the Federal Energy Policy and Conservation Act. The Council intends to recruit a couple of engineers for its buildings insulations program, three to four public relations personnel, an economist, a computer specialist and clerical support personnel. Additional student interns may also be recruited from the University of Pennsylvania and Penn State to provide technical expertise.

COMMONWEALTH OF PENNSYLVANIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	224	232	259	276	306	325	7%
NOISE[2]	1	1	6	9	12	12	117%
PESTICIDES[3]	13	13	27	27	30	30	23%
POTABLE WATER[4]	126	126	126	126	126	126	0
RADIATION[5]	24	24	30	30	36	39	11%
SOLID WASTE[6]	72	81	90	99	106	110	9%
WASTEWATER[7]	175	175	175	175	175	175	0
ENERGY[8]	27	38	50	50	50	50	14%
TOTALS[9]	662	690	763	792	841	867	6%

[1]The above represents only state agency personnel.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above represents optimum growth projections for state agency personnel, but does not include 5,750 commercial and 50,520 private applicators to be certified.

[4]The above includes only state agency personnel.

[5]The above includes only state agency personnel.

[6]The above does not include private sector personnel for which no data were available.

[7]The above includes only state agency personnel.

[8]The above totals include only state energy agency personnel.

[9]Insufficient data to make realistic projections (re: water programs).

EDUCATION

Several colleges and universities in the Commonwealth of Pennsylvania offer environmental career options. Bachelor degrees are available from both Temple University in Philadelphia and Pennsylvania State University in University Park. Pennsylvania State offers an undergraduate program in Environmental Engineering, as well as an associate degree in Air Pollution Control Engineering Technology. The Environmental Engineering program provides the students with a choice of electives in water, wastewater, solid waste, radiation, and noise. The associate degree program concentrates upon technical skills in sciences, electronics, and air pollution control.

Temple University, likewise, awards an associate degree in Environmental Technology, in addition to the bachelor's degree in Environmental Engineering Technology. Supplementing the engineering fundamentals courses, the bachelor's program offers the students a choice of electives in industrial hygiene, wastewater, potable water, and solid waste. Students enrolled in the associate degree program are eligible to take many of the same electives offered in the bachelor's program.

Drexel University, located in Philadelphia, has both a Master's and Doctoral program in Environmental Engineering and Science. Program options are available in water, wastewater, industrial hygiene, air pollution control, solid waste, radiation and oder.

The Community College of Allegheny County, Boyce Campus has an Environmental Technology Program that culminates in an A.S. degree.

LEGISLATION

The environmental/energy legislation for Pennsylvania was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Resources Law

Air Pollution Control Act

Pesticide Control Act of 1973

Atomic Energy Development and Radiation Control Act

Environmental Radiation Protection Act

Solid Waste Management Act

Sewage Facilities Act

Clean Streams Law

National Environmental Energy Workforce Assessment

Phase I

PENNSYLVANIA

State Report

STATE PROFILE

The Commonwealth of Pennsylvania's rectangular shape encompasses 45,333 square miles. The 1975 estimated population of 11,827,000 places it fourth among the states. Philadelphia, the nation's fourth largest city, has declined in population since 1950. The 1973 estimate placed the number of persons living in Philadelphia at 1,861,719. Pittsburgh's population has also declined to the 1973 estimated level of 479,276.

Value added by manufacture exceeds $26.8 billion annually. Primary metals (steel predominates) account for $4.7 billion. The steel plants, concentrated in the Pittsburgh area, place Pennsylvania first in production of structural metal and steel wire. Machinery and electrical machinery, metal products, chemicals, food processing, and adult apparel are major industries. The per capita income (1975) was $5,874.

Mineral production is a major component of the Commonwealth's economy. Pennsylvania produces nearly all of the nation's anthracite coal and ranks third in bituminous coal extracted. Zinc, petroleum, cement, lime, clays, stone, and iron round out the mineral production, valued at $2.7 billion in 1975.

Mountain ridges run through the center of the state, extending northeast to southwest. In the west and southeast portions of the state are fertile, prosperous farmlands. Agricultural receipts exceeded $1.6 billion in 1975. Dairy products, chickens and turkeys accounted for a large portion of the total. Pennsylvania ranks first

PENNSYLVANIA POLLUTION CONTROL AND ABATEMENT AGENCIES

The Pennsylvania Department of Environmental Resources has responsibility for most of the state's pollution control and abatement activities, with some authority delegated to the Philadelphia Department of Public Health and the State Department of Agriculture.

The Department of Environmental Resources delegates authority through four Deputies, including Administration, Enforcement, Resources Management, Environmental Protection, and an Office of Planning and Research. The Deputy for Environmental Protection delegates authority to an Associate Deputy for Technical Programs and an Associate Deputy for Field Operations.

The Bureau of Land Protection administers the state's solid waste program through the Division of Solid Waste Management which includes a Program Services and Evaluation Section, a Management Planning Section, a Program Development Section and an Operations and Compliance Section. The Division has set up regional offices in Norristown, Wilkes-Barre, Reading, Harrisburg, Williamsport, Pittsburgh, and Meadville to administer the solid waste program more closely.

The Solid Waste Management Division employs a total of 65 professional, technical and clerical employees in all phases of the program. This program includes the disposal of domestic and commercial wastes, sewage and industrial waste sludges, coal refuse, industrial and agricultural solid wastes, septic tank pumpings, junk auto disposal, hazardous wastes and resource recovery activities.

The Bureau of Water Quality Management administers the state's wastewater program through its Division of Water Quality, and the water supply program through its Division of Water Supply and Sewerage. The Division of Industrial Wastes and Erosion Regulation has responsibility for regulating industrial wastes.

The Bureau of Air Quality and Noise Control administers the state's air and noise pollution control programs. This bureau is made up of the Divisions of Air Resources Management and Research, Technical Services and Monitoring, and Abatement and Compliance.

The Bureau of Radiological Health has partial responsibility for the state's radiation program. This Bureau includes the Divisions of Reactor Review and Environmental Surveillance, and Radiation Control. The Philadelphia Department of Public Health also has partial administrative responsibility for the state's radiation program through its Occupational and Radiological Health Section.

Another resource which the Department of Environmental Resources draws on to carry out its pollution abatement and control activities is its own analytical laboratory. In addition, the Department incorporates the Citizens Advisory Council, the Environmental Quality Board, the State Board for Certification of Sewage Treatment Plant and Waterworks Operators, and the State Conservation Commission.

Finally, the state's pesticide control program is administered through the Bureau of Plant Industry of the Pennsylvania Department of Agriculture.

Pollution Control and Abatement Programs

I. AIR

A. Introduction

Air pollution control and abatement activities in Pennsylvania are the responsibility of the Bureau of Air Quality and Noise Control, located within the Department of Environmental Resources (DER). Pennsylvania's efforts in air pollution control originated with the passage of the Air Pollution Control Act of 1960. The Act was later amended and the functions given to the Department. Powers and duties given to DER under the Act include:

1) right to enter property for the purpose of investigating for non-compliance;

2) access to materials under investigation;

3) receive, initiate and investigate complaints;

4) study and research air pollution causes and effects;

5) evaluate motor vehicle emission control programs;

6) determine the degree of air pollution in Pennsylvania;

7) encourage the formulation and execution of air quality plans by associations of municipalities;

8) encourage voluntary efforts and cooperation;

9) conduct and supervise educational programs;

10) provide technical assistance to local communities;

11) develop and conduct with local communities programs relating to air pollution control and prevention; and,

12) order abatement of air polluting activities and require installation of air pollution control equipment.

In 1970, with the creation of DER, an Environmental Quality Board was established which is responsible for rules and regulations governing

air pollution control in Pennsylvania. The Board has the authority to:

- adopt rules and regulations for the prevention, control, reduction, and abatement of air pollution;
- establish and publish the maximum quantities of air contaminants that may be permitted;
- classify air contamination sources by levels and types of emissions;
- recommend to the Secretary of Transportation, performance and specification standards for emission control systems on motor vehicles;
- adopt rules and regulations for periods when air pollution levels could lead to an acute threat to health; and,
- adopt rules and regulations for the approval and recission and suspension of local air pollution control agencies.

There are six Air Quality Control Regions (AQCR) in Pennsylvania as provided for in the State Implementation Plan (SIP). The following table lists the AQCRs and their attainment status of national ambient air quality standards as of June 30, 1976. This information is from EPA's State Air Implementation Plan Progress Report. As of June, 1976, there were 1,852 major polluting installations (capable of emitting over 100 tons of a pollutant each year) in the state. Of these, 1,684 were in compliance with the state law, 165 were in violation and the status of three others was undetermined.

TABLE I

COMMONWEALTH OF PENNSYLVANIA

Attainment Status of National Ambient Air Quality Standards
by Air Quality Control Region[1]

AQCR \ Pollutant	TSP	SO_2	CO	Ox	NO_2
Metropolitan Philadelphia Interstate (PA portion)	AR	X	AR	AR	
Northeast Pennsylvania-Upper Delaware Valley Interstate (PA portion)	AR			AR	
Northwest Pennsylvania-Youngstown Interstate (PA portion)	AR			AR	
Central Pennsylvania	AR			AR	
South Central Pennsylvania	AR			AR	
Southwest Pennsylvania	AR	AR	AR	AR	

[1]"X" indicates non-attainment of an applicable NAAQS, but no call for a SIP revision.

"AR" indicates non-attainment of an applicable NAAQS and a call for a SIP revision for attainment and maintenance.

A blank indicates attainment of an applicable NAAQS and no calls for SIP revisions.

B. Workforce Profile

The information for this section was obtained through on-site interviews with professionals working in the air pollution control program and from various materials provided by them.

The Bureau of Air Quality and Noise Control has a staffing level of 224 persons. As indicated in the following table, 89 are classified as engineers. These positions require a four-year degree in one of the engineering sciences. Program officials indicated that most of the program's engineers were chemical and electrical engineers although they are classified by the state as air pollution control engineers.

There are fifty persons classified as scientists who require a college degree in one of the physical or natural sciences. Thirty-nine of these persons are classified by the state's civil service as environmental protection specialists. Eight others are chemists and three are meteorologists. The program also includes thirty-three technicians who are not required to have college degrees. Persons with two-year degrees or some relevant work experience are often hired for these positions.

TABLE II

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Air Quality and Noise Control
Current (1976) Staffing Level

Position	1976
Engineer	89
Scientist	50
Technician	33
Other	52
TOTAL	224

C. Workforce Projections

Figures in this section are based on the best professional judgements of professionals working in the state air pollution control program. They represent projected growth within the Bureau of Air Quality and Noise Control.

Program officials have indicated that the program staffing levels can be expected to increase to a level of 325 persons, or a gain of 101, over a five-year period. This works out to an average percentage increase of 7 percent per year as indicated in Table III below. Professionals indicated that EPA has estimated a workforce of 405 persons would be required for implementation of the program. However, budget constraints and the tendency of the state to cut the size of environmental programs has limited the projected workforce growth.

Increases can be expected to occur in all categories, with the largest percentage increases in the engineer and technician categories. Opportunities will still be greatest for engineers since jobs are classified under the state's civil service and requirements for specific occupations are not expected to change.

Turnover in the program has historically been very low, about 2 percent, and is expected to remain at that level in the future.

TABLE III

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Air Quality
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	89	95	110	125	140	150		10%
Scientist	50	50	52	54	56	58		4%
Technician	33	35	40	40	50	55		11%
Other	52	52	57	57	60	62		2%
TOTAL	224	232	259	276	306	325	2%	7%

D. Training and Certification

With regard to training activities, the Bureau works cooperatively with the Pennsylvania State University. The University conducts a visible emissions course for state and local program officials. DER's Bureau of Personnel provides management training to Air Pollution Bureau personnel and the Bureau conducts its own informal on-the-job training for new hires to acquaint them with the operation of the Bureau.

The Bureau also takes advantage of training offered by EPA program officials indicated, however, that it is sometimes difficult to register Bureau personnel for some of these courses due to limitations on class size. In Fiscal Year 1976, 128 persons from Pennsylvania attended courses offered by EPA's Air Pollution Training Institute at Research Triangle Park, North Carolina.

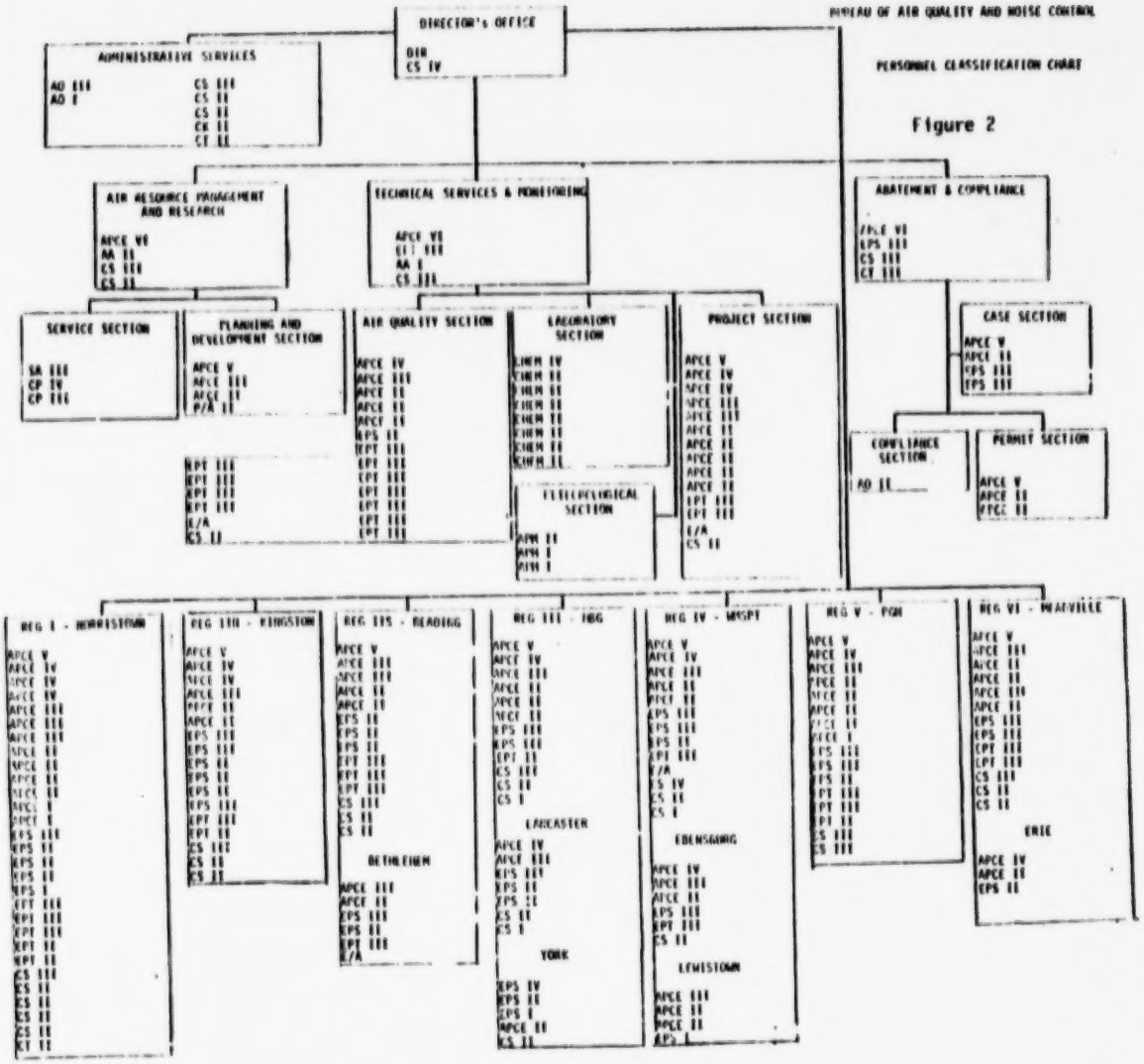
E. Career Potential

The potential for future jobs in air pollution control in Pennsylvania is somewhat limited because of state budget constraints. Opportunities will exist for engineers and technicians although there will continue to be a demand for scientists. Even though all the positions will not require a college degree, some college training is considered desirable for the technical positions.

F. Conclusion

The Bureau of Air Quality and Noise Control in Pennsylvania is responsible for the state's air pollution control program. The current staffing level of 224 is comprised of engineers, scientists, and

technicians. Budget constraints are anticipated to restrict program growth over the next five years. Opportunities that do exist will, for the most part, require professional training but a significant number of openings will be available to technicians.


BUREAU OF AIR QUALITY AND NOISE CONTROL
PERSONNEL CLASSIFICATION CHART
DIRECTOR's OFFICE
DIR
CS IV
ADMINISTRATIVE SERVICES
AD III
AD I
CS III
CS II
CS II
CS II
CT II
AIR RESOURCE MANAGEMENT AND RESEARCH
APCE VI
AA II
CS III
CS II
TECHNICAL SERVICES & MONITORING
APCE VI
ET III
AA I
CS III
ABATEMENT & COMPLIANCE
APCE VI
EPS III
CS III
CT III
SERVICE SECTION
SA III
CP IV
CP III
PLANNING AND DEVELOPMENT SECTION
APCE V
APCE III
APCE II
P/A II
EPT III
EPT III
EPT III
EPT III
E/A
CS II
AIR QUALITY SECTION
APCE IV
APCE III
APCE II
APCE II
APCE II
EPS II
EPT III
EPT III
EPT III
EPT III
EPT III
EPT III
LABORATORY SECTION
CHEM IV
CHEM II
CHEM II
CHEM II
CHEM II
CHEM II
CHEM II
ELECTROPHYSICAL SECTION
APH II
APH I
PIM I
PROJECT SECTION
APCE V
APCE IV
APCE IV
APCE III
APCE III
APCE II
APCE II
APCE II
APCE II
APCE II
EPT III
EPT III
E/A
CS II
CASE SECTION
APCE V
APCE II
EPS III
EPS III
COMPLIANCE SECTION
AO II
PERMIT SECTION
APCE V
APCE II
PTCC II
REG I - NORRISTOWN
APCE V
APCE IV
APCE IV
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APCE III
APCE III
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EPS II
EPS II
EPS II
EPT III
EPT III
EPT III
EPT II
EPT II
CS III
CS II
CS II
CS II
CS II
CT II
REG II - KINGSTON
APCE V
APCE IV
APCE IV
APCE III
APCE II
APCE II
EPS III
EPS III
EPS II
EPS II
EPS II
EPS III
EPT III
EPT II
CS III
CS II
CS II
REG III - READING
APCE V
APCE III
APCE III
APCE II
APCE II
EPS II
EPS II
EPS II
EPT III
EPT III
EPT III
CS III
CS II
CS II
BETHLEHEM
APCE III
APCE II
EPS III
EPS II
EPT III
E/A
REG III - HBG
APCE V
APCE IV
APCE III
APCE II
APCE II
APCE II
EPS III
EPS III
EPS II
EPT II
CS III
CS II
CS I
LANCASTER
APCE IV
APCE III
EPS III
EPS II
EPS II
CS II
CS I
YORK
EPS IV
EPS II
EPS I
APCE II
CS II
REG IV - MMSPT
APCE V
APCE IV
APCE III
APCE II
APCE II
EPS III
EPS III
EPS II
EPT III
E/A
CS IV
CS II
CS I
EBENSBURG
APCE IV
APCE III
APCE II
EPS III
EPT III
CS II
LEWISTOWN
APCE III
APCE II
APCE II
APCE I
REG V - PGH
APCE V
APCE IV
APCE III
APCE II
APCE II
APCE II
APCE II
EPS III
EPS III
EPS II
EPT III
EPT III
EPT II
CS III
CS III
REG VI - MEADVILLE
APCE V
APCE III
APCE II
APCE II
APCE III
APCE II
EPS III
EPS III
EPT III
CS III
CS II
CS II
ERIE
APCE IV
APCE II
EPS II

Figure 2

II. NOISE

A. Introduction

The noise program in the State of Pennsylvania is the responsibility of the Bureau of Air Quality and Noise Control, located in the Department of Natural Resources. The Bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority in control covers all environmental noise problems, which includes industrial noise that extends beyond the boundaries of a particular industrial establishment. Noise within industrial facilities is covered under the federal Occupational Safety and Health Act. The state is authorized to regulate noise under the Pennsylvania Noise Control and Abatement Act, Section 853.

There are twelve communities in the state which have local noise ordinances. Of these, eleven have regulations with regard to nuisance, five have zoning regulations, three regulate vehicle noise, one has regulations covering recreational vehicle noise, and one regulates aircraft noise. This breakdown is depicted in the following table.

TABLE IV

COMMONWEALTH OF PENNSYLVANIA

Community Noise Control Ordinances

City	Nuisance	Zoning	Vehicle	Rec/ Vehicle	Railroad	Aircraft	Construc.	Building
Allentown	X	X	X	-	-	X	-	-
Bethlehem	0	X	-	-	-	-	-	-
Dubois	0	-	-	-	-	-	-	-
Erie	0	-	-	-	-	-	-	-
Girard	-	X	-	-	-	-	-	-

TABLE IV
(continued)

City	Nuisance	Zoning	Vehicle	Rec/ Vehicle	Railroad	Aircraft	Construc.	Building
Harrisburg	X	X	X	X	-	-	-	-
Muhlenberg Tnshp.	0	-	-	-	-	-	-	-
Philadelphia	0	-	-	-	-	-	-	-
Pittsburgh	0	-	-	-	-	-	-	-
Scranton	0	-	-	-	-	-	-	-
State College	X	-	X	-	-	-	-	-
West Mifflin	0	X	-	-	-	-	-	-

KEY: X Regulation includes acoustical criteria
0 Regulation does not include acoustical criteria
- No regulation

Source: Sound and Vibration, December 1976, Clifford R. Bragdon, Contributing Editor.

The following table represents a sampling of noise restrictions for Pennsylvania. The source is Sound and Vibration, December 1976.

TABLE V

State Noise Restrictions

Motor Vehicle Mufflers	Motor Vehicle Sound Level Limits	Motorcycle Sound Level Limits	Off-Road Rec/Vehicle Sound Level	Snowmobile Sound Level Limits	Motorboat Sound Level Limits
YES	YES	YES	-	YES	-

Although the noise program in Pennsylvania exists on paper, there is currently no legislation to fund the program.

B. Workforce Profile

Information concerning staffing levels for the noise control program in Pennsylvania was obtained primarily through on-site interviews with professionals working in the program. The profile indicated is projected for persons working in the Bureau of Air Quality and Noise Control who could be involved only in the noise program.

At present, there is only one person, a scientist, involved in the noise program in the Bureau of Air Quality and Noise Control. The noise program does not formally exist in the state budget.

C. Workforce Projections

There are currently no funds allocated for noise control in Pennsylvania and, therefore, no positions funded. No workforce is projected in the absence of new legislation.

D. Training and Certification

Due to the fact that there is only one person involved in noise control in the state, there is currently no formal training offered at the state level. If the program continues to go unfunded, no training programs will be needed. On the other hand, if funds for noise control in Pennsylvania become available, program personnel would be entitled to attend the informal noise control workshops presented by the U.S. EPA. EPA offers no formalized training in noise at present.

Positions in noise control and abatement normally require a four-year degree as a minimum, usually in engineering or a science such as physics. Normally this has been accomplished through the general programs offered in colleges and universities with minimal training in specific disciplines of noise abatement and control.

Professionals involved in other pollution abatement activities in the state suggest that a need exists for a two-year program to train noise inspectors, should funding become available, to maintain local control of noise investigations. The general concensus of opinion was that with the situation as it is in the state noise program, education of the public should have top priority.

E. Career Potential

Career potential in the noise program is dependent in large part upon the availability of funds to expand the program over the next few years. If professional workforce projections hold true, there would be limited career opportunities for engineers and scientists. Generally, a four-year degree will be required with some specialized training in noise abatement and control or advanced training in acoustics. Several technical positions may be created if the resources become available to implement new programs.

F. Conclusion

The federal government encourages the states and municipalities to take the lead in noise control activities. However, the absence of any granting or funding authority has seriously hampered growth of a program in Pennsylvania and they lack the necessary funding to operate such a program without federal assistance. If funding should become available in the next few years, there will be limited demand for personnel trained in engineering, acoustics and some sciences.

III. PESTICIDES

A. Introduction

The Pennsylvania Department of Agriculture has responsibility for implementation of the state's pesticide control program. Within the Department, the program is located in the Bureau of Plant Industries.

The legal authority for pesticide regulation is the Pennsylvania Pesticide Control Act of 1973 and the regulations proposed under it. The law provides for the certification of pesticide applicators and the registration of pesticides and pesticide products.

The law also created the Pennsylvania Pesticide Advisory Board which is responsible for advising the Secretary of Agriculture on any problems relating to the use and application of pesticides. The Board consists of the following members: three licensed pesticide applicators; one entomologist; one environmental health specialist; one toxicologist; one plant pathologist; and, one representative each of the Pennsylvania Department of Agriculture, Pennsylvania Fish Commission, Pennsylvania Game Commission, Pennsylvania Department of Environmental Resources and Pennsylvania Department of Transportation. Also included in the Board membership is a representative from the agricultural chemical industry, the food processing industry, and from two producers of agricultural crops or products on which pesticides are applied or will be affected by application.

Pennsylvania has adopted ten categories for commercial applicator certification; however, there are no categories for private applicators. The commercial categories include:

1. Agricultural Pest Control
   a) Plant
      1) Agronomic
      2) Fruit
      3) Vegetables
   b) Animal
2. Forest Pest Control
3. Ornamental and Turf Pest Control
   a) Ornamental and Shade Trees
   b) Lawn and Turf
4. Seed Treatment
5. Aquatic Pest Control
6. Right-of-Way Pest Control
7. Industrial, Institutional, Structural and Health Related Pest Control
   a) Household
   b) Wood Destroying Pests
   c) Fumigation
   d) Weeds
8. Public Health Pest Control
   a) Vertebrate Pests
   b) Invertebrate Pests
9. Regulatory Pest Control
10. Demonstration and Research Pest Control

Commercial applicators may apply for a license as either an aerial applicator and/or ground applicator in each of the above categories.

B. Workforce Profile

Information for this section was provided through on-site interviews with professionals working in the pesticide program and the use of materials and documents supplied by them.

The current staffing level of Pennsylvania's pesticide program consists of thirteen people who are divided into three occupational categories as illustrated in Table VI. The program's one scientist is also the director. Only two additional people work in the central office and they are classified as "Other" in the table. They are both clerks whose

duties are the registration of pesticides and pesticide products, and matters pertaining to certification. The ten technicians in the program are pesticide field inspectors and are assigned to the Department of Agriculture's seven regional offices. The inspectors are a recent addition to the program, having been hired in 1975. Prior to this time, there were only two persons working in the program on the state level. The inspectors do not fall into any particular training background since there are no specific occupational requirements for this position. The positions are not part of the state's civil service system and the hiring is at the discretion of the program director. Generally, those hired for these positions have backgrounds in general agriculture or chemistry. All have high school educations and some have had college training.

In addition to state program personnel, professionals estimate that there are 50,520 private applicators and 5,750 commercial applicators in the state that must be certified under the law. Thousands of others, primarily farmers, are also pesticide applicators but do not require certification.

TABLE VI

PENNSYLVANIA DEPARTMENT OF AGRICULTURE

Bureau of Plant Industries
Current (1976) Staffing Level

Position	1976
Scientist	1
Technician	10
Other	2
TOTAL	13

TABLE VII

COMMONWEALTH OF PENNSYLVANIA

Private Sector Pesticide Workforce
Current (1976) Estimates

Applicator	Number
Private	50,520
Commercial	5,750
TOTAL	56,270

C. Workforce Projections

Data obtained for this section comes from on-site interviews with program professionals and represents the best professional judgements of those persons.

Program officials in the Bureau of Plant Industries have indicated that substantial growth in the pesticides program could occur over the next five years. The projections ranged from a minimum increase of four persons during this period to a maximum of 17. This would put the size of the program at between 17 and 30 people by 1982. Table VIII reflects staffing projections for the optimum increase of 17. The primary need is to increase the size of the field inspection staff. The table shows a doubling of the number of technician positions; however, not all of these are expected to be field inspectors. With optimum growth, the Bureau expects to utilize two or three laboratory technicians for pesticide analysis. These are included in the 20 technician positions. Presently, the Bureau has no facilities for

analysis so this activity is contracted out to private laboratories. The table also indicates potential for professionals trained in the natural sciences. Officials indicated that educational backgrounds in chemistry and entomology would be desirable, but this does not preclude those with other scientific backgrounds from being hired. The positions classified as "Other" are clerical and secretarial, and would continue to have the functions of registration and certification matters.

TABLE VIII

PENNSYLVANIA DEPARTMENT OF AGRICULTURE

Bureau of Plant Industries
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Scientist	1	1	1	1	1	1	n/a
Entomologist	0	0	1	1	2	2	20%
Chemist	0	0	2	2	3	3	10%
Technician	10	10	20	20	20	20	20%
Other	2	2	3	3	4	4	17%
TOTAL	13	13	27	27	30	30	23%

D. Training and Certification

Pennsylvania's State Cooperative Extension Service is responsible for developing and conducting pesticide applicator certification training programs for both commercial and private applicators. Although mandatory training is not required by law, the Extension has prepared both commercial and private applicator training programs. The commercial applicator programs consists of a series of home-study materials including a basic course covering federal and state standards, and a series of specialized courses for the individual categories and

subcategories of commecials applicator certification. This is designed to prepare the applicant for the two written examinations required for certification; one in basic pesticide regulation and use, and the other in the specialized category. In addition, commercial applicators may request individualized personal training if they feel the need for additional training beyond the home-study courses. Private applicators are certified by successful completion of the basic home-study course. Recertification procedures stipulate that applicators receive upgrade training at least every three years through attendance at conferences conducted by Penn State University or approved industry sponsored meetings. Officials estimate that as of January 1, 1977, 12,354 commercial applicators and 19,830 private applicators have been trained.

The Bureau of Plant Industries has no formal or informal training programs at the present time. This is due primarily to the small size of the staff and the fact that ten of the thirteen employees are located in regional offices. Professionals in the program anticipate that on-the-job training may be conducted once an increase in staffing is realized.

E. Career Potential

There appears to be a limited amount of career potential in pesticide control at the state level. Program officials suggested a wide range in the staffing projections for the next five years. If optimum projections are correct, there will be a demand for technically trained persons as field inspectors and laboratory technicians.

There will also be opportunities for professionals with scientific backgrounds, probably chemists and entomologists.

Career opportunities for commercial applicators are difficult to predict since no projections of workforce growth in this area are available. Since this appears to be the area with greatest personnel turnover, it can be assumed that the greatest career potential exists here. Other career possibilities may be available in the fields of integrated pest management and pesticide disposal, but figures are generally not available to provide information on the types of jobs or numbers of people that might be required. An exception is a U.S. Department of Agriculture study done in 1972 which indicated the potential workforce requirements for integrated pest management to be more than 2,350 persons in Pennsylvania. Most of these persons would be field scouts, a position requiring a high school education and some knowledge of entomology. The remaining persons would be professional crop protection specialists with backgrounds in the physical sciences. The Agriculture Department based its figures on one field scout per 2,000 acres of cropland and one crop protection specialist per 30,000 acres.

F. Conclusion

Pennsylvania's pesticide program is the responsibility of the Department of Agriculture and is concerned with the certification of pesticide applicators and registration of pesticides and pesticide products. There are currently thirteen people engaged in the program at the state level and most of these are field inspectors. Projections of future workforce vary from a few additional personnel to more than

doubling the program size. In either case, the number of additional jobs to be created will be few.

IV. POTABLE WATER

A. Introduction

The Pennsylvania Department of Environmental Resources conducts the public water supply program in the state through its Bureau of Water Quality Management, Division of Water Supply and Sewerage. The mission of the program is to ensure that all public water supplies in the state provide safe and sanitary drinking water to all citizens. The passage of the Safe Drinking Water Act (SDWA) in 1974 authorized the federal government to assist the states with funding to carry out primacy in establishing and enforcing the National Primary Drinking Water Regulations and to provide for federal assistance to states through federal grants and the establishment of a program to protect underground sources of drinking water. Each public water supply in the state is required to monitor, test and otherwise operate in compliance with the regulations. The water supply program and SDWA are aided in these efforts by the Federal Water Pollution Control Act, which sets water quality standards and controls the release of pollutants into the water system.

The Division of Water Supply and Sewerage, in conjunction with the Department's Bureau of Community Environmental Control, has been evaluating the Department's present drinking water supply program in light of the SDWA which allows the state to request primary enforcement responsibility. The staff has participated in significant EPA program developments to evaluate the impact on, and opportunities for state assumption of primacy for SDWA. At present, financial and legislation constraints make it unlikely that Pennsylvania will assume primacy in the near future.

B. Workforce Profile

Information for this section was gathered from interviews with program professionals and through documents provided by them.

About 7 percent of the Bureau's 311 person-years, or 22 person-years are devoted ot the water supply program. Because the same personnel provide service to the water supply and wastewater programs, Table XII in the Wastewater section of this report illustrates total staffing levels and occupational categories.

C. Workforce Projections

Workforce projections for public water supply in Pennsylvania are unavailable at this time. Financial constraints will undoubtedly inhibit growth at the state level, also making it unlikely that the state will assume primacy for SDWA at present. Nevertheless, the water providers must still comply with SDWA regulations, and it is possible that this will require an increased workforce in various capacities, including an increased demand for water treatment plant operators.

D. Training and Certification

Most of the training offered to water supply personnel in the state is at the college level. Programs in environmental engineering and technology at Pennsylvania State University, Temple University, Drexel University, and the Community College of Allegheny County, all offer at least one course in water technology or water treatment. (Refer to Selected Post Secondary Institutions with Formal Environmental/Energy Programs). Program professionals have expressed a need for more

administrative training on the part of water supply personnel, including some statistical instruction.

The federal government provides training assistance to state and local water supply personnel throught the SDWA grant-in-aid program. Under this program, a state may apply for a certain amount of training monies to be utilized by their employees to attend workshops sponsored by groups such as EPA or the American Water Works Association (AWWA) as well as courses sponsored by local colleges/universities.

Certification of waterworks operators is carried out by the State Board for Certification of Sewage Treatment Plant and Waterworks Operators of the Department of Environmental Resources.

E. Career Potential

The potential for careers in water supply in the state is dependent, in large part, upon the state's ability to finance new training programs and support new positions, as well as the federal government's commitment to provide funding to the state for expansion of its water supply program. Nevertheless, Pennsylvania's decision not to assume primacy for SDWA in the near future will certainly be an inhibiting factor with regard to job increases in the program.

F. Conclusion

Pennsylvania's decision not to assume primacy for SDWA implementation will have some impact on the public water supply program in the state. Expansion of the program may be hampered over the next few years. The federal government will retain responsibility for implementation.

V. RADIATION

A. Introduction

Pennsylvania's radiation protection activities are located in the Bureau of Radiological Health of the Department of Environmental Resources (DER). The program operates under the authorities provided by the Atomic Energy Development and Radiation Control Act, which first established the program in 1966. This law gives responsibility to DER for the licensing, control and regulation of radiation, radiation sources, and radiation source users. The powers and duties of DER as prescribed by law are as follows:

1) Develop and conduct programs for evaluation of hazards associated with the use of radiation sources;

2) Develop and conduct programs for the control and regulation of radiation, radiation sources, and radiation source users;

3) Formulate, adopt, promulgate, and repeal rules and regulations relating to the control of radiation;

4) Issue such orders or modifications thereof as may be necessary in connection with proceedings under this act;

5) Advise the Governor and the Legislature with regard to the status of radiation control, and consult and cooperate with the various departments, agencies, and political subdivisions of the Commonwealth, the Federal government, other states, interstate agencies, political subdivisions, and with groups concerned with control of radiation sources;

6) Have the authority to accept and administer loans, grants, or other funds or gifts, conditional or otherwise, in furtherance of its functions, from the Federal government and from other sources, public or private;

7) Encourage, participate in, or conduct studies, investigations, training, research and demonstrations relating to control of radiation sources; and

8) Collect and disseminate information relating to control of radiation sources.

COMMONWEALTH OF PENNSYLVANIA

Figure 3

Nuclear Power Facilities

Site	Plant Name	Capacity (Net M We)	Type	Status	Utility	Scheduled Operation
Peach Bottom	Peach Bottom Atomic Power Station: Unit 2	1,065	BWR	OL	Philadelphia Electric Co.	1974
Peach Bottom	Peach Bottom Atomic Power Station: Unit 3	1,065	BWR	OL	Philadelphia Electric Co.	1974
Pottstown	Limerick Generating Station: Unit 1	1,065	BWR	CP	Philadelphia Electric Co.	1981
Pottstown	Limerick Generating Station: Unit 2	1,065	BWR	CP	Philadelphia Electric Co.	1982
Shippingport	Shippingport Atomic Power Station: Unit 1	90	PWR	--[1]	Duquesne Light Co. & ERDA	NA
Shippingport	Beaver Valley Power Station: Unit 1	852	PWR	CP	Duquesne Light Co. & Ohio Edison Co.	1975
Shippingport	Beaver Valley Power Station: Unit 2	852	PWR	CP	Duquesne Light Co. & Ohio Edison Co.	1981
Goldsboro	Three Mile Island Nuclear Station: Unit 1	819	PWR	OL	Metropolitan Edison Co.	1974
Goldsboro	Three Mile Island Nuclear Station: Unit 2	906	PWR	CP	Metropolitan Edison Co.	1978
Berwick	Susquehanna Steam Electric Station: Unit 1	1,050	BWR	CP	Pennsylvania Power & Light Co.	1980
Berwick	Susquehanna Steam Electric Station: Unit 2	1,050	BWR	CP	Pennsylvania Power & Light Co.	1982

Key: OL - Operating License
CP - Construction permit issued
1 - Operating license not required

The Department is also authorized under the law to provide for the licensing of users of radioactive materials or equipment utilizing radioactive materials, and for the registration of other radiation sources and/or users of other sources as determined to be necessary for the protection of public health and safety.

The Act also created a seven-member Advisory Committee on Atomic Energy Development and Radiation Control appointed by the Governor. The purpose of this Committee is to make recommendations on the development and utilization of atomic energy resources and on the regulation and control of radiation. Members of the Committee are required to have technical expertise in atomic energy and radiation protection and reflect varied interests in these area. The Secretaries of Environmental Resources and Commerce are ex-officio members of the committee.

Under the Atomic Energy Development and Radiation Control Act, the State Department of Commerce is designated as the lead agency. Its functions include the promotion and development of atomic energy resources and the coordination of atomic energy activities of various agencies and units of government. There are eleven nuclear power facilities located or planned in Pennsylvania, as depicted in the chart on the preceding page. The information was excerpted from the Nuclear Regulatory Commission Annual Report, 1975, and supplemented by "Significant U.S. Power Plants in Planning or Construction", July 1, 1976, Presidential Task Force on Power Plant Acceleration, Federal Energy Administration.

B. Workforce Profile

Data compiled for this section was provided primarily through on-site interviews with program professionals. The figures represented are for personnel working in the Bureau of Radiological Health.

There are presently twenty-four persons in the program as indicated in Table IX. Most of these are classified as scientists in the table. This category includes radiation health physicists which make up most of the scientist category, chemists, and environmental protection specialists. The positions require a minimum of a four-year degree in a physical science or a related field. Requirements for radiation health physicists include an undergraduate degree plus one year of graduate study in health physics or radiological health or certification by the American Board of Health Physics in lieu of the graduate study. Additional personnel in the program include a nuclear engineer, two laboratory technicians, and four clerical employees.

Private sector radiation program personnel are estimated to consist chiefly of personnel employed at the three nuclear power facilities now in operation and privately employed X-ray technicians. Staffing levels for the nuclear power facilities were not available and information on X-ray technicians was not obtained since these were not considered to be environmental control positions.

TABLE IX

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Radiological Health
Current (1976) Staffing Level

Position	1976
Engineer	1
Scientist	17
Technician	2
Other	4
TOTAL	24

C. Workforce Projections

Professionals working in the radiation program in Pennsylvania anticipate a moderate increase in staffing over the next five years. A primary reason for this is the completion of five additional nuclear power plants which are expected to be operating at that time. This can be expected to increase the workload at the state level in terms of nuclear reactor review and environmental surveillance and require additional trained personnel in the operation of the nuclear facilities. No projections are available as to the number of persons that may be required at the facilities.

With current state budget restrictions in effect for all environmental programs, any expansion or increase in personnel is significant. Program professionals anticipate a growth in personnel from the current 24 to 39, an increase of 15 in the next five years. Table X below illustrates these projections. Program officials also indicated that radiation health physicists will continue to be in the greatest demand. These persons are required to have completed some graduate study in health physics or radiological health

but may have undergraduate degrees in a variety of disciplines. The Bureau actively seeks persons with different backgrounds to give a more generalized and varied approach to the program. In addition to the scientists, additional engineers and technicians will be required over the next five years, although to a much lesser extent. It is anticipated that three additional nuclear engineers will be needed along with two additional laboratory technicians. The program will also require increased clerical support.

TABLE X

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Radiological Health
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	1	1	2	2	3	4	n/a	37%
Scientist	17	17	20	20	23	25	n/a	8%
Technician	2	2	3	3	4	4	n/a	17%
Other	4	4	5	5	6	6	n/a	9%
TOTAL	24	24	30	30	36	39	n/a	11%

D. Training and Certification

Pennsylvania's Bureau of Radiological Health participates in several types of training programs. Most of the training available in radiation protection is provided by the federal government and the state's program officials indicate that they take advantage of these federal programs as often as possible. The only limiting factor is financial. In some cases the costs of the courses or travel expenses preclude the state from participation.

Examples of federal training programs in which state personnel have participated include courses offered by the Nuclear Regulatory Commission at Oak Ridge, Tennessee; by the Bureau of Radiological Health under HEW; and laboratory courses offered by the Energy Research and Development Administration, the Federal Energy Administration, and the Nuclear Regulatory Commission. Additionally, informal on-the-job training is provided by the Bureau to acquaint new personnel with the state regulations and operating procedures of the Bureau.

Most of the professional positions in the Bureau are classified as radiation health physicists and job requirements stipulate that persons filling these positions must have one year of graduate training in health physics or radiological health or be certified by the American Board of Health Physics in lieu of this graduate study. As a result, most new personnel have background training in radiation protection.

E. Career Potential

Program officials anticipate that requirements for future careers in radiaiton protection will not change significantly from current requirements. Within the state program, the majority of available positions will continue to require radiation health physicists and the requirements for these positions are not expected to change. Career potential will be very limited for non-professionals.

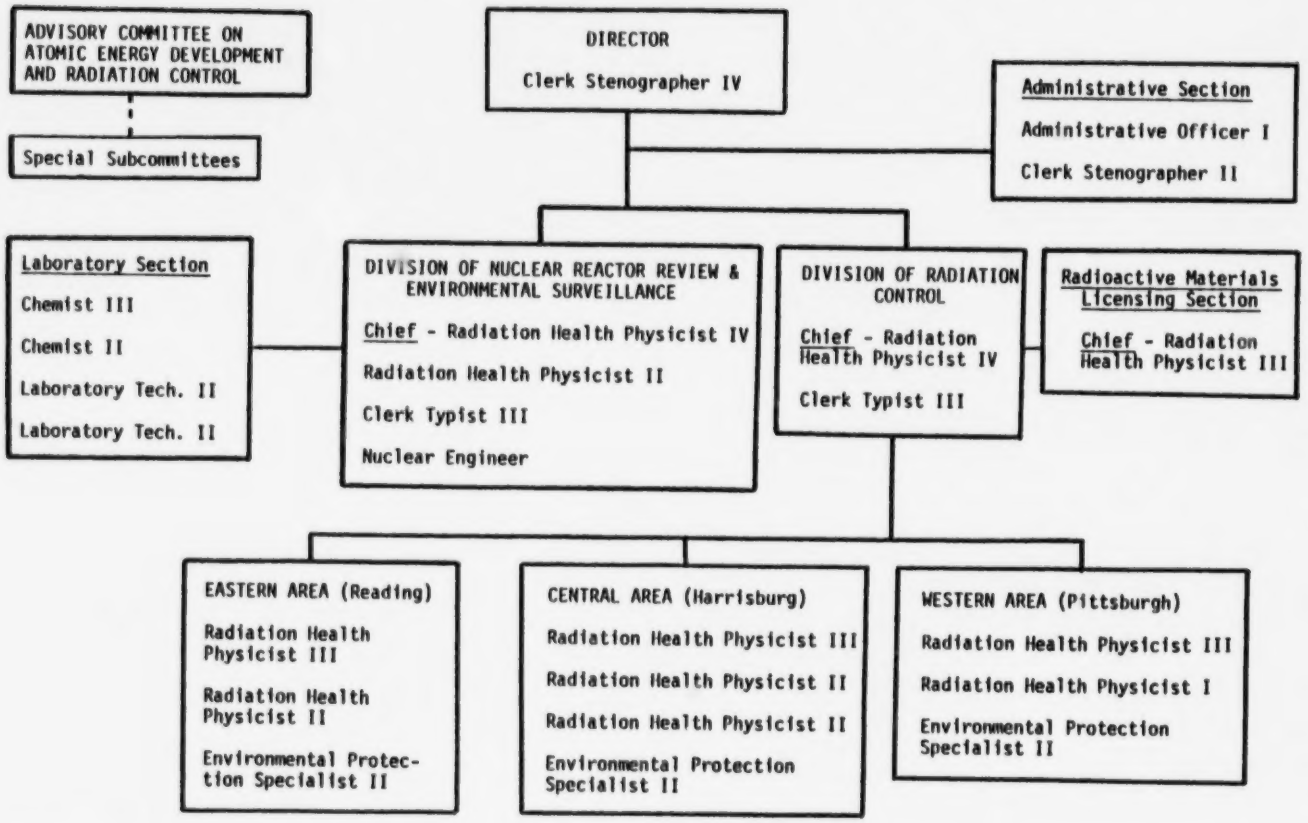
In the private sector, career potential will exist at nuclear power plants. It is estimated that five additional nuclear facilities will be in operation by 1981. Although it is not possible to determine how many jobs will be available, it is anticipated that most will require professional training.

F. Conclusion

Pennsylvania has had a radiation control program in effect for over a decade which gives the state the authority to license, control, and regulate radiation, its sources and users. The state has a work-force of 24 persons in radiation, most of whom are professionals with backgrounds in radiation protection. Moderate increase in staffing levels is foreseen for the next five years due primarily to an increase in nuclear power facilities. Occupational requirements will tend to remain the same, indicating a need for professionally trained personnel. Much of the private employment will be concentrated at nuclear power plants and medical facilities with X-ray equipment.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF RADIOLOGICAL HEALTH

Figure 4



VI. SOLID WASTE

A. Introduction

The solid waste management program originated in Pennsylvania in 1966, with a federal program grant which financed a state-wide inventory of collection, processing and disposal practices. It was found that the annual quantities of disposal wastes amounted to ten million tons of domestic wastes and twelve million tons of industrial and food processing wastes. All of this waste was handled by 648 open dumps and landfills, 96 hog feeding operations, 37 incinerators and 1 composting plant. The survey also found that only 15% of the disposal facilities met minimum compliance standards, 30% of the households in the state did not have refuse collection services, and that planning and regulalations at the local level were virtually non-existent.

The findings of the 1966 survey resulted in the enactment of the Pennsylvania Solid Waste Management Act in 1968, the first comprehensive state-wide solid waste legislation in the nation. This Act provided the state with the basic tools to construct a long range planning program at the local level and an enforcement program to upgrade solid waste management practices throughout the state. Rules and regulations adopted under the Act provide rigid control over land disposal sites. Permits are required for disposal sites and before a permit can be issued, a review and approval of soil and geological characteristics must be made. Groundwater monitoring wells must be installed to monitor movement of leachate and quarterly water analyses are required by the state. In 1972, the Department of Environmental Resources (DER)

was created and solid waste management became a function of this agency. The program is now administered through the Division of Solid Waste Management of the Bureau of Land Protection within DER.

Pennsylvania's solid waste management program has grown steadily since enactment of the 1972 law. County-wide solid waste management plans have been developed in 66 of the 67 counties and regional plans have been adopted in 3 multi-county regions. There are 32 management agencies in the form of municipal, county and multi-county authorities and 23 additional agencies are in the planning stages. Implementation of the plans has proceeded slowly due to limited funding by local governments and that many of the state's 2,565 municipalities do not have a sufficient population density to require a solid waste management plan.

Current estimates of waste disposal in Pennsylvania is approximately 100 million tons annually. This includes 10 million tons of residential and commercial wastes, 12 million tons of industrial residuals and sewage sludges, 45 million tons of mining and steel-making wastes, and 20 million tons of agricultural related wastes. Landfill is the most frequent method used for disposal. There are nearly 500 disposal facilities within the state, of which 123 are permitted sanitary landfills. Eighty percent of these are privately owned and operated. The 375 other sites operate without permits and the DER has not taken final action to close them down pending the establishment of viable alternatives for disposal in those areas. The Department has closed another 443 open-burning dumps since 1971. It is estimated that of the 500 sites in operation, about 130 have an ultimate capacity of

less than 150,000 tons, 325 have capacities between 150,000 and 500,000 tons, and 45 have capacities of more than 500,000 tons.

A major step toward the development of resource recovery systems was taken in 1974, with the enactment of the Pennsylvania Solid Waste Resource Recovery Development Act. Its purposes, as defined in the Act, are to promote the development of solid waste disposal/processing and resource recovery systems, and to provide financial assistance to municipalities in the design and construction of these systems to enhance the quality of air, water, and land resources. The Act also established a $20 million low-interest revolving loan fund. Due to state budget deficits the $20 million for the loan fund has been withheld from the department and is not presently available for implementation of the Act. An amendment to the Act allowed for a limited grants program, however, and DER has made grant offers totaling $2.5 million in 1976 to four projects in the state. An additional $1.5 million has been granted in 1977 for four projects. The concept of the demonstration grant program allows the state to assume part of the risks during initial development of the systems.

Two resource recovery plants are currently in operation and a permit has been issued for another. The operational plants include a steam producing facility in Harrisburg which utilizes 3,000 tons per week of wastes and a privately-owned composting plant in Altoona which contracts with the city to handle 50 percent of its wastes. The capacity of the plant is 50 tons per day. The plant for which a permit has been issued is planned for Palmer Township. The state has participated in the financing of 50 percent of the feasibility study and market analysis

for this project which will use refuse-derived fuel in cement kilns. The capacity of this plant is estimated to be 500 tons per day, but it is unknown when it will be operational.

Problems encountered in the development of resource recovery include high costs and finding available markets for recovered materials. The capital outlay required to construct plants to recover heat and energy from domestic wastes produced by Philadelphia and Pittsburgh alone would cost $200 million. A study done by the City of Philadelphia shows that fluctuations in market demand and prices and lack of ready access by industry to large quantities of materials are primary reasons for failure of recycling activities. The study indicates that a strong market for recovered metals and the sale of steam exists in the Philadelphia area but markets for other recovered products are weak.

In addition to the current resource recovery plants, two communities in Pennsylvania, Allentown and Abington, have facilities for separate collection and recycling of wastes. Several other communities have commissioned feasibility studies for resource recovery plants. These include: Allegheny County, Philadelphia, Scranton, and Berks County.

B. Workforce Profile

Information for this section was obtained primarily from on-site interviews with professionals working in the program. The staffing levels apply to persons working in the Division of Solid Waste Management.

Pennsylvania's solid waste program has a current staffing level of 72 people. This represents a decrease by seven persons from the staffing level one year ago. The seven positions were held by technicians and supported by federal programs. The division has not been allowed to

fill these or any other vacancy that may occur due to severe budget cutbacks. The only positions that can be filled are those for which there is a critical need. Most of the current staff is comprised of scientists, as indicated in the following table. They are primarily environmental protection specialists, a position which requires a minimum of a bachelor degree in a physical or natural science. Others in the scientist category are soils scientists, requiring a four-year degree in this discipline. The program also employs nine geologists and one sanitary engineer. The "Other" category is composed of clerical and administrative personnel.

TABLE XI

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Land Protection
Division of Solid Waste Management
Current (1976) Staffing Level

Position	1976
Engineer	1
Geologist	9
Scientist	48
Other	14
TOTAL	72

Additional workforce in solid waste management exists at the community level in landfill operations and waste collection and in the private sector in landfill operations, collection, and resource recovery. Because these activities are operated locally and independently of one another, no readily available staffing configurations exist.

C. Workforce Projections

Data contained in this section is based on the best professional judgement of persons working in the program and planning materials and documents provided by them.

Within the Division of Solid Waste Management, officials estimate that the workforce will increase by thirty-eight people or approximately 9 percent per year over the next five years. One of the reasons for the increase is the expanded effort of the federal government in solid waste management and an increasing emphasis on resource recovery and hazardous waste disposal. The Division anticipates acquiring additional personnel as a result of passage of the Resource Conservation and Recovery Act. Projections are based on this expectation, although the exact numbers and occupational categories of persons to be employed as a result are not known. As the projections depicted in the following table indicate, the largest percentage increase is in the engineer category, although the actual number remains low. The addition of seven engineers, expected to be sanitary engineers, would provide one engineer for each regional office. There will also be a need for trained geologists and for environmental protection specialists as projected by the scientist category.

TABLE XII

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Land Protection
Division of Solid Waste Management
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Engineer	1	3	5	7	8	8	64%
Geologist	9	11	13	15	17	17	13%
Scientist	48	51	54	57	60	64	6%
Other	14	16	18	20	21	21	6%
TOTAL	72	81	90	99	106	110	9%

Local and private sector workforce projections were difficult to obtain for the reasons discussed in the workforce profile section. The fact that local jurisdictions and industry operate independently of one another makes it virtually impossible to get an accurate projection.

D. Training and Certification

Training for solid waste personnel is done both by the Division of Solid Waste Management and the State Department of Community Affairs. On the local level the Division conducts seminars for community officials and the Community Affairs Department offers a landfill operators course. No figures are available for the number of persons attending these sessions.

The Division also provides a formal on-the-job training program for all new personnel to acquaint them with the state solid waste laws and regulations and, also, the procedures of the Department. Division personnel are sent to U.S. EPA courses as often as possible; they also attend courses and seminars provided by professional organizations and associations, such as the National Center for Resource Recovery.

Additionally, the Department reimburses personnel for tuition costs of attending local college and university courses.

Potential for future solid waste training activities exists under the recently enacted Resource Conservation and Recovery Act. The Act authorizes EPA to enter into grants or contracts for the development and implementation of programs to train individuals for occupations in solid waste management. It also authorizes funding for training instructors and supervisory personnel for the instruction and supervision of persons involved in the design, operation, and maintenance of solid waste disposal and resource recovery equipment and facilities. It is anticipated that this federal funding will serve to supplement and increase the state's current training programs.

E. Career Potential

Potential for careers in solid waste management in Pennsylvania appears to be promising. The increased federal commitment to solid waste management through the Resource Conservation and Recovery Act, and the number of resource recovery facilities coming into operation over the next several years is indicative of the growth that can be expected in this field.

The careers will tend to move away from the conventional landfill and incinerator operators to more highly trained individuals for resource recovery operations. The opportunities will exist for engineers and scientists in the planning, design, and operation of these facilities. Although the demand for landfill operators can be expected to decline, a certain number of these positions will continue to exist

in the foreseeable future since resource recovery is not practical in many smaller communities and rural areas.

F. Conclusion

Pennsylvania's solid waste program needs are expanding at a time when budget constraints in the state have reduced staff expansion. Passage of the Resource Conservation and Recovery Act is expected to help the program through increased federal funding.

The current staffing level of 72 is a decrease from the previous year, however, program officials expect to see an increase in staffing by approximately 9 percent over the next five years. Most of the opportunities will be for professionals with scientific backgrounds for positions such as environmental protection specialists and soil scientists. Opportunities will also exist for engineers and geologists.

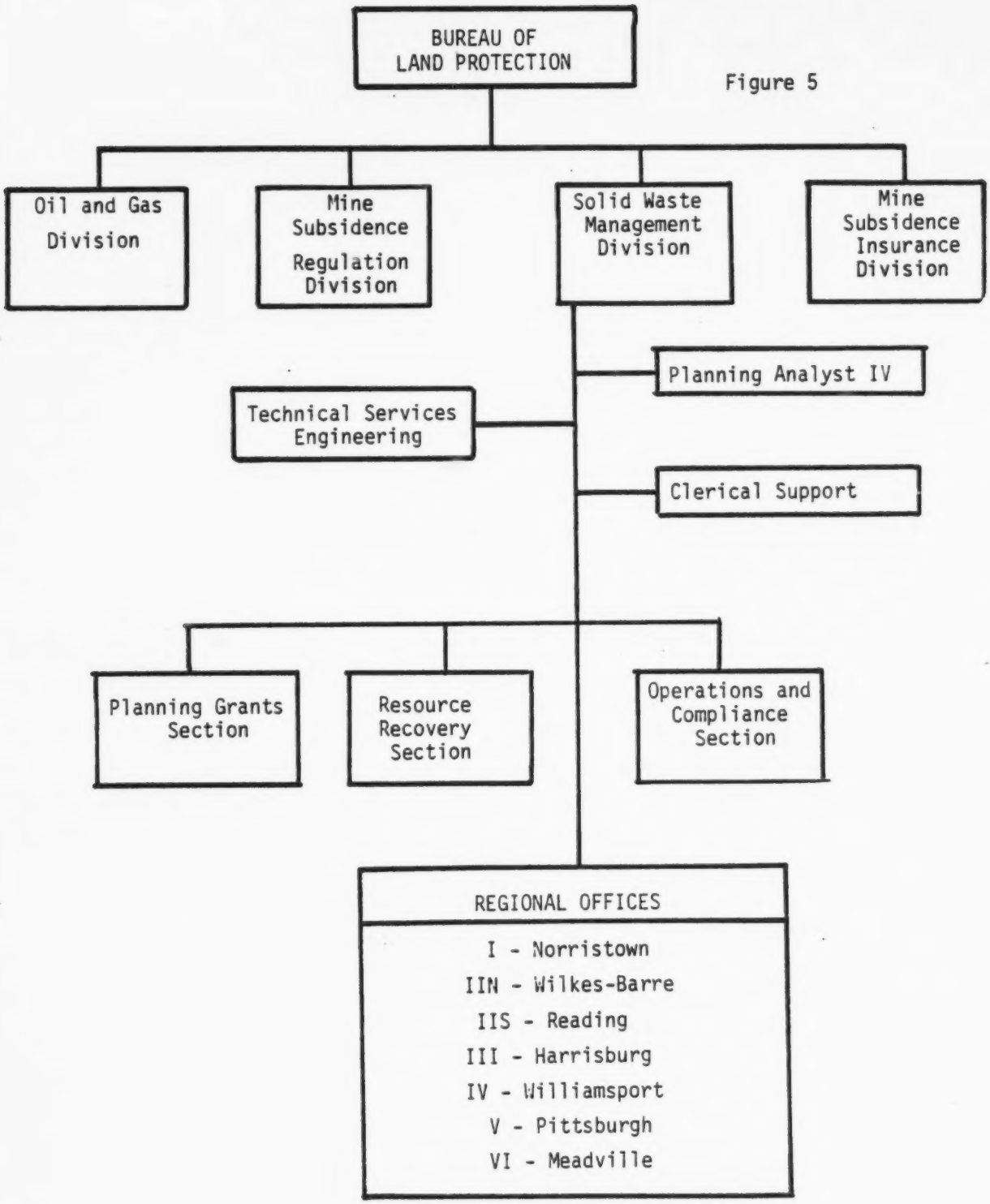

BUREAU OF
LAND PROTECTION
Oil and Gas
Division
Mine
Subsidence
Regulation
Division
Solid Waste
Management
Division
Mine
Subsidence
Insurance
Division
Planning Analyst IV
Technical Services
Engineering
Clerical Support
Planning Grants
Section
Resource
Recovery
Section
Operations and
Compliance
Section
REGIONAL OFFICES
I - Norristown
IIN - Wilkes-Barre
IIS - Reading
III - Harrisburg
IV - Williamsport
V - Pittsburgh
VI - Meadville

Figure 5

VII. WASTEWATER

A. Introduction

Pennsylvania's wastewater program is the responsibility of the Bureau of Water Quality Management within the Department of Environmental Resources. The objectives of the Bureau is the implementation of the program are described in Pennsylvania's Water Quality Management Program Plan for Fiscal Year 1977, and are as follows:

> To assemble and maintain a highly qualified and competent staff to deal with the complex problem of relating water uses and related land uses in attaining the environmental goals of the Commonwealth and its citizens.
>
> To prevent uses of waters that degrade Pennsylvania's environment and the health, safety and well-being of the public.
>
> To encourage and require cost-effective public investments in wastewater management.
>
> To orchestrate international, federal, interstate, state, regional and local resources in a cost-effective manner that minimizes redundancy and encourages the involvement of local decision-making and public participation.
>
> To work toward the delegation of program elements to the lowest level of government willing and able to carry them out.
>
> To stimulate and encourage research and technology transfer which will enhance the cost-effectiveness and quality of the program.
>
> To develop, encourage and participate in water quality management planning by the use of technically sound, environmentally sensitive and publicly responsive planning methods, and to orchestrate the implementation of plans and the conduct of a continuing planning program in a cost-effective manner.

To carry out a fair and equitable compliance program designed to focus on cases that do the most harm to the health, safety and well-being of the public.

To assume leadership in resolving conflicts and problems through joint action among individuals, units of government, industries and other groups and organizations.

To implement an up-to-date and effective management information system to monitor program effectiveness.

Responsibilities for administration of the municipal construction grants and NPDES programs have not as yet been delegated by EPA to the State of Pennsylvania.

B. Workforce Profile

Data for this section were compiled through on-site interviews with professionals working in the wastewater program and by the use of materials and documents supplied by them.

The Bureau of Water Quality Management has performed numerous activities in carrying out the mandates of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972. The state has applied for, but not yet received delegation of the federal NPDES Permit Program. However, the state continues to coordinate NPDES-related enforcement activities with EPA in accordance with their Fiscal Year 1976 grant agreement.

Pennsylvania has its own permit system for various environmental protection programs. For the period of July, 1975 through June, 1976, 2,413 permits were acted upon. Also, for this same period, 23,494 field contacts (inspections, field meetings) were made. A compliance strategy is being employed involving the review and ranking of problems

in priority order, and a concentration of enforcement efforts on the major problems.

Both the Delaware Valley Regional Planning Commission and the Southwestern Pennsylvania Regional Planning Commission were designated as area-wide and basin water quality management planning agencies under Section 208 of FWPCA. The Comprehensive Water Quality Management Planning program has been continued in other portions of the state to serve as the base for "208" planning. A delineation of water quality problem areas was made, and agencies in those areas were provided an opportunity to request designation. Pennsylvania did not make any additional "208" designations during 1976; however, the state reserved the right to make additional designations in the future should the need arise.

The Non-Point Source Program carried out erosion and sediment control and dams and encroachment programs during Fiscal Year 1976 as described in the 1976 Program Plan. In addition, the Department's Office of Resources Management continued to carry out its Operation Scarlift Program to control pollution from abandoned mines.

During Fiscal Year 1976, EPA Region III performed a Quality Assurance evaluation on all state laboratories. Steps were taken to implement some of the recommendations. Legislation has been introduced to establish a state-wide laboratory certification program and is in committee at the present time. The ambient monitoring program has been carried out as anticipated in the 1976 Program Plan.

The current program support of Pennsylvania's wastewater program, located in the Bureau of Water Quality Management, is shown in Table XIII. The personnel can be classified into the occupational categories as illustrated in the table. Almost all of the engineers are sanitary engineers with a minimum requirement of a college degree in engineering. In addition to the chemists, microbiologists, geologists and biologists, other personnel working in the program are environmental protection specialists who are required to have a college degree in the physical or biological sciences.

TABLE XIII

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

Bureau of Water Quality Management
Water Pollution Control Programs

Support Function	Person-Years
Municipal Facilities Const.	15
Point Source Permits (NPDES)	40
Non-point Source Management Activities	22
Water Quality Management Planning (to include water quality standards)	59
Monitoring (to include ambient and effluent monitoring)	114
Enforcement (to include compliance assurance activities)	29
Training, operations and maintenance	15
Public Participation	3
Administration	14
Other	0
TOTAL	311

C. Workforce Projections

Program officials in Pennsylvania were unable to make any projections of workforce demand over the next five years because of the budgetary situation which exists in the state regarding environmental programs. Funding for the programs has been cut backand only critical staffing vacancies in the program can be filled at present.

D. Training and Certification

The Bureau trains in-house personnel through formal and informal on-the-job training. These personnel are also given non-technical departmental training and sent to various outside technical/non-technical programs such as seminars, symposiums, conferences, and workshops. Bureau personnel are also encouraged to take job-related courses sponsored by local colleges/universities.

Pennsylvania's Department of Community Affairs has the responsibility of ensuring that municipalities and local governments have adequately trained personnel to comply with state laws and regulations. In this capacity, the Department's Municipal Training Branch is responsible for the training of wastewater treatment plant operators. This training includes preparing uncertified operators for certification examinations, and improving the skills and knowledge of certified operators. Between July 1, 1975 and June 30, 1976, the Department of Community Affairs trained 1,473 operators in both water and wastewater areas.

E. Career Potential

Career potential in the wastewater program is impossible to predict accurately since projections of workforce demand are not available. Because of the budgetary problems within the state, limited opportunity for expansion of the workforce exists at the present time in this program. Additional federal funding may help to alleviate this situation. It can be assumed, however, that the demand for trained operations personnel in sewage treatment plants will continue to exist at the local level since the number of facilities will grow.

F. Conclusion

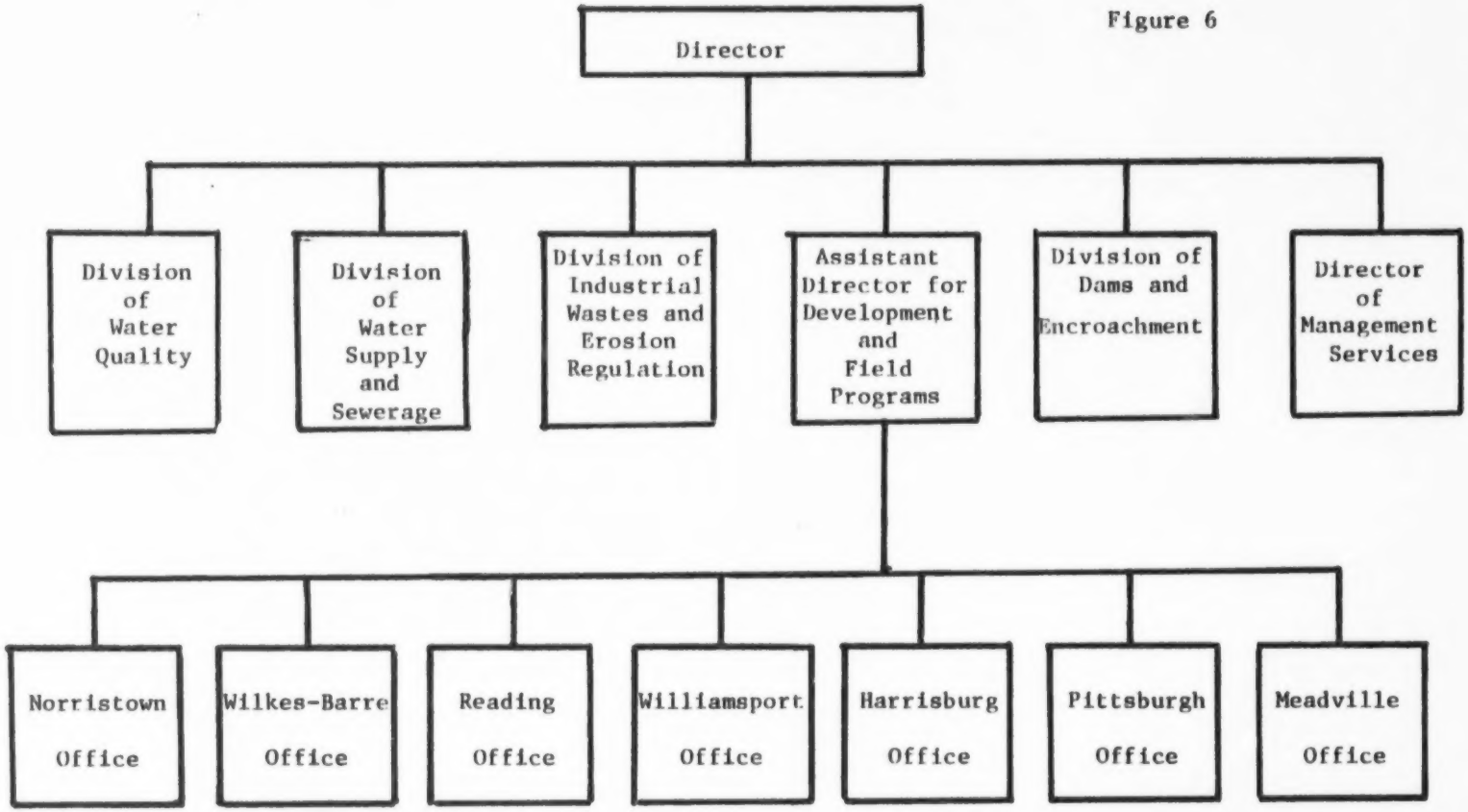
The wastewater program in Pennsylvania has been hampered by budget problems within the state. With annual reductions in funding and personnel, program personnel are unable to predict what the future workforce might be. Opportunities for careers in the state program are limited at the present time, with potentially greater possibilities at the local level or in private industry.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES

BUREAU OF WATER QUALITY ENACTMENT

Figure 6



VIII. ENERGY

A. Introduction

Energy office functions in Pennsylvania are the responsibility of the Governor's Energy Council, which was established by Executive Order of the Governor on February 11, 1974. The Executive Order states, in part, that the Energy Council's purpose is to:

> "...strengthen the capacity of the Commonwealth to respond to the complex problems related to energy, I hereby create and establish the Governor's Energy Council. As a centralized function of my office, the Council shall be the principal authority within the Commonwealth for all aspects of energy policies and programs. It shall have the authority to exercise the control and conservation necessary to insure the proper management of energy use and conservation throughout the Commonwealth. The Chairman of the Council may appoint an executive director and such staff as is necessary to support the Council in the fulfillment of its functions. The Lt. Governor is designated as Chairman of the Council. All agencies under my jurisdiction are directed to fully cooperate with the efforts of the Council and to provide such assistance and information as the chairman, members, and executive director of the Council may require."

Pennsylvania has eleven nuclear power facilities located or planned to be located within its borders. Four of these facilities are owned and operated by the Philadelphia Electric Company. Two Peach Bottom Units are 1,065 megawatt capacity boiling water reactors which became operational in 1974. Pottstown units of the same capacity are currently being constructed by Philadelphia Electric Company and are scheduled to become operational in the early 1980s.

Duquesne Light Company and Ohio Edison Company have a 852 megawatt capacity unit in operation and another unit under construction (scheduled

to become operational in 1981) at Shippingport. Metropolitan Edison has an operational 819 megawatt unit at Goldsboro and another 906 megawatt unit under construction at the same site. Pennsylvania Power and Light Company has two 1,050 megawatt capacity units under construction at Berwick, and these are to become operational by 1980 and 1982.

Major programs of the Governor's Energy Council are as follows:

Coal Policy: the Council developed a Coal Revitalization Policy, adopted in August 1974, which includes the following recommendations: 1) the development of manpower skills and safety in the coal industry, including educational, technical, and engineering specialties; 2) the promotion of growth in the industry with Commonwealth assistance; 3) the continued application of modern air, water, and land-use standards and the use of all means to meet air quality emission and ambient standards; 4) the stimulation of private financing to expand the coal industry, abate pollution, and revitalize the railroad system; 5) the facilitation of growth of a viable rail system to ship coal from Pennsylvania mines to users; 6) the development of new technology; and 7) the participation of Pennsylvania in the development of national coal policy.

Energy Parks: a preliminary feasibility study of the energy park concept (multiple generating facilities at one site with an aggregate range of 10,000 to 20,000 megawatts) was commissioned by four Pennsylvania public utilities. Positive finding encouraged the utilities to discuss the concept with the Council which is now studying the socio-economic impacts of energy parks. The Council is also seeking public opinion through a series of statewide meetings.

Conservation: the Council has prepared a draft comprehensive statewide conservation policy which will be discussed at public meetings throughout the state. The policy emphasizes strongly the State establishing itself as a model in conservation programs. This includes incentives for car pool and public transit use, the purchase of energy efficient equipment, the adoption of life cycle costing principles, and the establishment of a true "recycling ethic" within the Commonwealth. In addition, the policy proposes a massive consumer education and information program, increased attention to the energy conserving characteristics in the design and operation of residential, commercial, and industrial structures, and several ideas related to transportation which require further study.

Allocation: an Emergency Fuel Line has been established with computerized information retrieval capability to assist in the allocation of petroleum products. In addition to providing conservation information, the Line also serves as a citizen referral system for shortages in fuels and other materials.

Winterization: the Department of Community Affairs administers a program which provides home insulation for low and fixed income families. The target is 562 units. A grant is available for self-installed insulation in another 100 units. The potential for upgrading multi-family units is being studied. The program is supported entirely by State redevelopment funds.

B. Workforce Profile

The Governor's Energy Council is basically a coordinating agency which draws much of its technical expertise from other state agencies. Most of its personnel have a public relations orientation. Technical expertise can also be provided through contractual arrangements with universities in Pennsylvania. Under the Executive Order of the Governor, the Energy Council has the authority to mandate a technical workforce from the other state departments. The Council is composed of members of many state agencies so there is a very good relationship with other department organizations within Pennsylvania.

The Energy Council has a present total staff of about 27 to 28 persons. Excluding assistants and clerical support, the Energy Council has the following staff composition:

TABLE XIV

COMMONWEALTH OF PENNSYLVANIA

Governor's Energy Council
Current (1976)=Staffing Level

Position	1976
Executive Director	1
Assistant Director	1
Energy Parks Coordinator	1
Energy Conservation Coordinator	1
Coal Policy Coordinator	1
Assistant Fuel Allocation Coordinator	1
Human Resource Advisor	1
Natural Gas Coordinator	1
Solar Energy Coordinator	1
Energy Information Component Data Personnel	1
Student Interns	6
TOTAL	16[1]

[1]Does not include coordinator assistants and clerical support who would bring the total staff to 27-28.

The Coordinators provide liaison with other officials in the Pennsylvania government for supportive services. The Energy Council has a winterization program to provide insulation for poor people's housing. This program is a nationwide leader and is administered by the Department of Community Affairs.

C. Workforce Projections

The Governor's Energy Council anticipates hiring an additional 22-23 people to bring its total staffing level to about 50 by 1978. The Council is currently recruiting personnel to fulfill state emergency and conservation planning mandated under the Federal Energy Policy and Conservation Act. The Council plans to recruit a couple of engineers for its buildings program, three to four public relations personnel, an economist, a computer specialist,

and clerical support personnel. Additional student interns may also be recruited from the University of Pennsylvania and Penn State to provide technical expertise.

D. Training and Certification

The Governor's Energy Council does not provide formal training programs for in-house staff but does send personnel to state sponsored training courses at times. For example, if a computer specialist needs additional training, that person may be sent to the state sponsored data management course. Most training for in-house staff is on-the-job. The Council, in conjunction with state universities, does sponsor training courses for school building superintendents.

E. Career Potential

Planned expansion of the Governor's Energy Council, the main energy agency in Pennsylvania, should lead to the development of several careers. Prospects appear good for engineers and public relations personnel as energy conservation and planning receive continued emphasis in the years ahead. Greater use of nuclear power could also result in career development in that field.

F. Conclusion

The Pennsylvania energy situation is a reflection of growing national concerns and actions to practice energy conservation. A number of unique programs has resulted in a rapidly-growing energy agency. Career prospects are bright in a limited number of professional categories.

Selected Post Secondary Institutions
With Formal Environmental Energy Programs

There are several colleges and universities in Pennsylvania which offer program in environmental science and pollution control technology. Although less than 50 percent of all the schools in Pennsylvania are represented in our sample, findings indicate that most colleges in the state offer at least one or two courses dealing with environmental problems. Many offer a variety of courses within their departments of biology, chemistry, civil engineering and others. For the purpose of this study, only those schools which offer outstanding degree programs in environmental science, engineering or technology and are geared toward preparing students for careers in the field of pollution control are represented.

There are other schools in Pennsylvania which meet these program criteria and, although not formally represented in this study, merit brief mention here. One is the School of Engineering at the University of Pittsburgh, which offers a graduate program in environmental systems engineering and a program in civil engineering with a specialization in environmental and sanitary engineering. Carnegie-Mellon University in Pittsburgh offers a number of environmental programs within the various divisions of the university in conjunction with numerous ongoing research projects.

Pennsylvania State University also offers an intercollege graduate program in environmental pollution control leading to the degrees of Master of Science, Master of Environmental Pollution Control, and Master of Engineering in the areas of air and water pollution control and the disposal of solid wastes.

SENIOR INSTITUTIONS

Drexel University
Philadelphia, Pennsylvania

Program: Environmental Engineering and Science (M.S. in Environmental Engineering, M.S. in Environmental Science, Ph.D.)

Hours required for major: Quarter - (M.S.) - 48, (Ph.D.) individually arranged.
Program Inception: 1963
Staff Size: Twelve professors, thirteen associate professors, five assistant professors.
Enrollment: Cumulative enrollment of 30 plus full-time and 77 part-time students.
Graduates (1976): (M.S. in Environmental Science) 15, (M.S. in Environmental Engineering) 12, (Ph.D.) 4.
Placement: Approximately 100%
Graduate Work: not currently available

Courses

Occupational Health Law
Public Finance and Cost Benefit Analysis
Capital Building
Introduction to Management Mathematics
Operations Research I, II
Advanced Mathematical Programming
System Simulation
Applied Dynamic Programming
Human Resources Development
Statistical Decision Theory I
Statistical Sampling and Design of Experiments
Advanced Environmental Instrumentation
Ecology
Fate of Pollutants in the Air and Water Environments
Advanced Environmental Chemistry
Air Pollution Meteorology I, II
Environmental Physiology
Theory of Sorption Phenomenon
Particle Dynamics
Sanitary Microbiology
Aquatic Ecology
Environmental Health
Epidemiology
Public Health Administration
Environmental Systems Analysis
Technology and Society
Urban Systems Design I, II
Industrial Ventilation

Industrial Hygiene
Taste, and Odor, Theory and Testing Methodology
Industrial Hygiene Laboratory
Closed Environments
Toxicology
Air Pollution Control Processes
Air Pollution Sources
Air Resources Management
Air Pollution Source Sampling
Air Sampling and Analysis
Water Quality Control Laboratory
Stream Analysis and Pollution Control
Radiological Health
Radiobiology
Environmental Engineering Unit Operations - Chemical and Physical
Environmental Engineering Unit Operations - Biological
Advanced Waste Treatment
Solid Waste Systems
Combustion Theory
Incinerator Design
Advanced Solid Waste Systems
Solid Waste Analysis
Industrial Waste Treatment
Environmental Project Analysis
Special Topics
Research Methods I, II, III
Research Thesis
Human Engineering
Transport Process
Engineering Geology
Water and Waste Water Treatment Design
Water Resources Systems Design
Construction Management Planning and Operations
Introduction to Hydrology
Hydrology Stream Flow
Hydrology Ground Water
Water Resources Planning and Development I, II, and III
Planning for Engineers I, II, and III
Fluid Dynamics I, II, and III
Physiology of Growth and Development
Radiochemistry Lab
Radiochemistry
Advanced Engineering Mathematics I, II, and III
Mathematics 1-6
Cultural History of Technology
Science, Technology and Public Policy

SENIOR INSTITUTIONS

Pennsylvania State University
University Park, Pennsylvania

Program: Environmental Engineering (B.S.)

Hours required for major: Credits - 141
Program Inception: 1972
Staff Size: not available due to the interdisciplinary nature of the program
Enrollment: 130
Graduates (1976): not available
Placement: Approximately 80%
Graduate Work: not available

Courses - Selected

Water Pollution Control
Introduction to Air Pollution Control
Solid Waste Management
Acoustics and Noise Control
Water Pollution Control Processes
Small Particle Technology
Introduction to Micrometeorology
General Acoustics
Introduction to Audiology
Noise Control in Machinery
Radionuclear Applications
Radiological Safety
Radioactive Waste Management
Water Resources Engineering
Water and Wastewater Transport Systems

Program: Air Pollution Control Engineering Technology (A.E.)

Hours required for major: Credits - 73-74
Program Inception: 1967
Staff Size: not available due to the interdisciplinary nature of the program
Enrollment: an estimated 8-10
Graduates (1976): an estimated 6-8
Placement: all
Graduate Work: an estimated 10%

Courses - Selected

Introductory Chemistry
Engineering Orientation
Engineering Drawing

English
Technical Mathematics
Chemical Principles
Experimental Chemistry
Basic Computer Programming
Fundamentals of D.C. Circuits
D.C. Circuits Laboratory
Electrical Circuits
Electrical Circuits Laboratory
Technical Calculus
Fundamentals of Semiconductors
Technical Physics
Industrial Chemistry
Basic Mechanics
Elementary Thermo and Fluid Dynamics
Effective Speech
Air Resource Management
Air Pollution Analysis Instrumentation
Sampling and Monitoring Program
Introductory Meteorology

SENIOR INSTITUTIONS

Temple University
Philadelphia, Pennsylvania

Program: Environmental Engineering Technology (B.S.)

Hours required for major: Semester - 124
Program Inception: 1973
Staff Size: One professor, two associate professors, one assistant professor, one instructor.
Enrollment: 57
Graduates (1976): 9
Placement: estimated 2-3 per year
Graduate work: estimated 1-2 per year

Courses

Statistics
Ecosystems and Man
The Engineering Profession
Professional Seminar
Statics and Strength of Materials
Engineering Economy
Fluid Mechanics
Applied Hydraulics
Thermodynamics I
Introduction to Environment
Sanitary Chemistry and Microbiology
Environmental Instrumentation
Environmental Technology
Environmental Field Operations
Environmental Systems Design
Air Pollution Control Systems
Water Pollution Control Systems
Industrial Hygiene
Solid Waste Management
Sewer Design
Water Treatment
Environmental Regulations
Introduction to Chemistry
Fluids
Heat Energy

Program: Environmental Technology (A.S.)

Hours required for major: Semester - 64
Program Inception: 1971
Staff Size: One professor, two associate professors, one assistant professor, one instructor.

Enrollment: 7
Graduates (1976): 2
Placement: 2
Graduate Work: not currently available

Courses

Same courses as available through the Environmental Engineering Technology Bachelor's Degree program.

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Community College of Allegheny County - Boyce Campus
Monroeville, Pennsylvania

Program: Environmental Technology (A.S.)

Hours required for major: Semester - 63-66
Program Inception: 1973
Staff Size: not available due to the interdisciplinary nature of the program
Enrollment: 7 full-time and 17 part-time students
Graduates (1976): 1
Placement: Most students are currently employed in a related field.
Graduate Work: 0

Courses

Man and the Biological World
Man and the Physical World
Introduction to Instrumentation
Wastewater Technology
Water Technology
Human Ecology
Wastewater Technology
Water Quality

State Legislation

PENNSYLVANIA GENERAL

TITLE:

Environmental Resources Law
Pennsylvania Code 71-510

PURPOSE:

To provide for the coordination of state environmental activities and to create a department of environmental resources.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Department of Environmental Resources
Environmental Quality Board

AUTHORIZATIONS:

To assume certain duties of the Department of Forests and Waters, the Department of Mines, the Land Restoration Board, the Department of Health, and the Air Pollution Control Commission;
To purchase, hold and manage state forests;
To supervise water resources of the state;
To supervise operation of state parks;
To undertake flood control measures;
To enforce state mining laws;
To issue waterworks permits and control water supplies;
To develop state environmental plans.

PENNSYLVANIA AIR

TITLE:

Air Pollution Control Act
Pennsylvania Code

PURPOSE:

To provide for the control, abatement, and reduction of air pollution to protect the health, general welfare and property of the people.

DEFINITIONS:

1. Department
2. Board
3. Hearing board
4. Person
5. Air contaminant
6. Air pollution
7. Air contamination
8. Air contamination source
9. Stationary air contamination source
10. Region
11. Approved air pollution control agency

ADMINISTERING AUTHORITY:

Department of Environmental Resources
Environmental Quality Board

AUTHORIZATIONS:

To enter and inspect property in enforcement of the act;
To require air contamination source records;
To investigate complaints and enforce the act;
To develop a comprehensive air pollution control plan;
To conduct air contaminant and air pollution studies;
To issue regulations pursuant to the act;
To establish air quality standards;
To declare air pollution emergencies.

PROHIBITED ACTS:

To fail to comply with any rule or regulation;
To fail to keep any required records;
To violate any emergency orders.

PENALTIES:

Criminal - fines of from $100 to $1,000 or 10 to 30 days imprisonment;
Civil - fines of up to $10,000 and $2,500 per day.

PENNSYLVANIA PESTICIDES

TITLE:

Pesticide Control Act of 1973
Pennsylvania Code 3-111.21

PURPOSE:

To provide for the control of pesticides through registration of pesticides and certification and licensing of pesticide applicators.

DEFINITIONS:

1. Active ingredient
2. Administrator
3. Adulterated
4. Animal
5. Antidote
6. Applicators
7. Beneficial insects
8. Board
9. Certified applicator
10. Commercial applicator
11. Defoliant
12. Desiccant
13. Device
14. Distribute
15. Environment
16. Establishment
17. Equipment
18. Fungus
19. Highly toxic
20. Imminent hazard
21. Inert ingredient
22. Ingredient statement
23. Insect
24. Label
25. Labeling
26. Land
27. Misbranded
28. Municipal corporation
29. Nematode
30. Permit
31. Person
32. Pest
33. Pesticide
34. Pesticide dealer
35. Pest management consultant
36. Plant regulator
37. Private applicator
38. Producer
39. Protect health and environment
40. Public operator
41. Registrant
42. Registration
43. Restricted use
44. Snails or slugs
45. Under the direct supervision of
46. Unreasonable adverse effect on environment
47. Weed
48. Wildlife

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Board

AUTHORIZATIONS:

To require registration of all pesticides sold in the state;
To require proper labeling of pesticides;
To issue regulations pursuant to the act;
To classify pesticides and restrict their usage;
To enter and inspect property in enforcement of the act;
To regulate pesticide and pesticide container storage and disposal;
To license pesticide dealers;
To establish applicator certification standards;
To categorize commercial applicators;
To certify private and commercial applicators.

CERTIFICATION OR LICENSING:

Commercial and custom applicators must be licensed;
Dealers must be licensed and farmers obtain permit;
Written examination required of commercial applicators and pest management consultants.

PROHIBITED ACTS:

To fail to register pesticides as required;
To alter or destroy any pesticide label;
To engage in pesticide application business without license;
To act as pest management consultant or pesticide dealer without license;
To use restricted use pesticides without permit;
To violate other regulations issued under the act.

EXEMPTIONS:

No regulations apply to general use pesticides.

PENALTIES:

Civil - fines of up to $10,000;
Criminal - fines of up to $300 or 90 days imprisonment.

PENNSYLVANIA RADIATION

TITLE:

Atomic Energy Development and Radiation Control Act
Pennsylvania Code

PURPOSE:

To encourage the development and use of atomic energy for peaceful purposes, consistent with the health and safety of the public.

DEFINITIONS:

1. Atomic energy
2. Radiation
3. Person
4. Radiation source
5. Radiation source user
6. Approved school
7. Committee
8. Licensed practitioner
9. Radiologic technologist
10. Radiologic technology
11. Radiological physicist
12. Radiologist
13. Supervision

ADMINISTERING AUTHORITY:

Department of Commerce
Department of Environmental Resources
Advisory Committee on Atomic Energy Development and Radiation Control
Radiologic Technologist Licensing Advisory Committee

AUTHORIZATIONS:

To evaluate programs of atomic energy resources and ionizing radiation control;
To provide technical assistance to other state agencies;
To enter into agreements with other state and federal agencies;
To conduct studies regarding atomic energy research;

AUTHORIZATIONS (Cont'd):

To license and control radiation, radiation sources, and radiologic technologists;
To issue regulations pursuant to the act;
To establish standards for radiologic technologists;
To generally enforce provisions of the act.

CERTIFICATION OR LICENSING:

All radiologic technologists and other persons applying ionizing radiation to human beings must be licensed according to guidelines set forth in the act.

PROHIBITED ACTS:

To engage in the practice of radiologic technology without a license;
To falsely represent one's self as a radiologic technologist;
To violate other provisions or regulations of the act.

EXEMPTIONS:

Can be established by regulation.

PENALTIES:

Fines of up to $10,000 or six months in jail;
Civil fines of up to $10,000 and $500 per day may also be imposed.

NRC AGREEMENT STATE: No

PENNSYLVANIA RADIATION

TITLE:

Environmental Radiation Protection Act
Pennsylvania Code

PURPOSE:

To provide for the minimization of the routine and accidental effects of exposure to radiation and radioactive material.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Department of Environmental Resources

AUTHORIZATIONS:

To carry out a comprehensive program of radioactive monitoring;
To assist in the preparation of a radiation emergency response plan;
To prepare an annual report on environmental radiation levels.

PENNSYLVANIA SOLID WASTE

TITLE:

Solid Waste Management Act
Pennsylvania Code

PURPOSE:

To provide for the planning and regulation of solid waste storage and disposal.

DEFINITIONS:

1. Department
2. Secretary
3. Solid waste
4. Solid waste management system
5. Municipality
6. Person

ADMINISTERING AUTHORITY:

Department of Environmental Resources
Solid Waste Advisory Committee

AUTHORIZATIONS:

To administer solid waste management programs;
To develop a statewide solid waste plan;
To issue regulations pursuant to the act;
To provide assistance to local governmental units;
To issue permits for local solid waste facilities.

PROHIBITED ACTS:

To construct or operate a solid waste facility without a permit;
To dispose of solid waste other than at a proper facility;
To burn solid waste;
To dispose of solid wastes in any mine.

PENALTIES:

Fines of up to $300.

PENNSYLVANIA WASTE WATER

TITLE:

Clean Streams Law
Pennsylvania Code

PURPOSE:

To preserve and improve water purity in the state for the protection of public health, animal and aquatic life, industrial consumption and recreation.

DEFINITIONS:

1. Board
2. Department
3. Establishment
4. Industrial waste
5. Institution
6. Mine
7. Municipality
8. Person
9. Pollution
10. Sewage
11. Waters of the Commonwealth

ADMINISTERING AUTHORITY:

Department of Health
Sanitary Water Board

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To establish policies of water quality management;
To administer all water permit programs;
To conduct surveys, investigations, and research regarding waters of the state;
To supervise all water pollution control activities in the state.

PROHIBITED ACTS:

To discharge sewage into waters without permit;
To cause or allow industrial waste or other discharges into waters of the state without proper permit;
To cause water pollution through mine operation;
To violate other act provisions or regulations.

PENALTIES:

Criminal - initial violation - fines of from $100 to $1,000 or six months in jail; subsequent violation - fines of from $100 to $5,000 or one year imprisonment;
Civil - fines of up to $10,000 and $500 per day.